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CONTENTS

The editorial and business offices of the *Railroad Age Gazette* in Chicago have been moved from 160 Harrison street and are now permanently established in the Plymouth building on Dearborn street.

The investment viewpoint on the difference between railway and industrial bonds as "legals" for savings banks has been illustrated sharply in Connecticut, a state of many savings banks and of large and growing deposits. Some months ago there was introduced in the Connecticut legislature a bill making a legal investment for the banks of the bonds of the Southern New England Telephone Company, a corporation that controls for telephone purposes the whole state except a single town, has paid 6 per cent. dividends for many years and has net earnings of more than ten times the interest charge upon its bonded debt. But the legislature has turned the bill down, mainly on the theory that a telephone security must be classed as an "industrial" and that the precedent of legalizing an industrial bond is a bad one. Yet at present in Connecticut practically every bond of a railway character can be held by the savings banks and the same is true of probably five-sixths of the street railway bonds outstanding also; nor does there appear to have been any corporative resistance to the telephone bill which was rejected on general principles. As a case pretty typical of the relative, if not absolute, value of the railway mortgage security as judged by the investor, the Connecticut incident is impressive.

If a division superintendent issues a semi-official circular to his men, as, for example, at Christmas time in the way of congratulation, or of admonition at the opening of a season of heavy traffic, why should he not have his circular prepared by an expert? If he were to give his men a dinner, he would probably go to the best hotel on the line of the road. If he were to buy a carpet, to be laid where its presence would be a credit or a discredit to his company, he would see that the goods were of the very best quality and the pattern of the most tasteful design. The very circular that we are talking about would be printed, no doubt, by the best printer to be found. Yet slovenly language—sentences, even, which one has to read twice to find out their precise meaning, may almost be said to be the rule, in documents of this kind. "Circularizing" employees is a good thing, if managed wisely. Why not? Railway officers talk about loyalty (and sometimes to excess, especially when they intimate that the employee will suffer for bread and butter if he does too much independent thinking); why not stimulate loyalty by stepping outside the cold, official dignity now and then? Some officers do this occasionally, but most officers ought to have a good deal more practice at it. In political affairs—whence comes our use of the term "loyalty"—leaders often talk when there is not much of anything to say, merely to keep the channels of communication open; why should not railway leaders follow the political example? We do not need to suggest subjects for friendly communications from employer to employee, for the wideawake railway officer has in mind most fruitful suggestions already; or at any rate must think of them frequently. But this suggestion about the manner of communicating is worth while, we believe. A letter to the chairman of the board of directors suggesting your own promotion would be composed with great care, and the services of a lawyer to edit it would be paid for freely, if thereby the letter could be made stronger. An inscription on a loving cup to be given to a fellow officer or a fellow club-member would be put in language which would pass muster with the most particular critic. Is not a circular which is designed to increase the efficiency of your operating force more important than either of these things? But if an officer *will* do his own finishing—the first draft must be his own, if he is to attach an honest signature to the circular—let him give his days and nights to the writings of the Addison of the American railway world, Charles Paine. There are good writers in the present generation of railway men; but to name these men would be an unwarranted disturbance of their modesty!

CLASSIFICATION OF ADDITIONS AND BETTERMENTS.

The principal differences between the classification of expenditures for additions and betterments prescribed by the Interstate Commerce Commission, effective July 1 and just published, from the tentative classification given out in 1907 are first: the distinction between additions and betterments has been eliminated in the present issue and, second, where the tentative classification provided that when any abandonment of property occurred, whether such property was replaced by new and improved property or not, the additional cost of the property abandoned should be credited to additions and betterments and charged to operating expenses. The present classification provides that operating expenses should be charged only in case the abandoned property is replaced, and the

amount to be charged is now based on the cost of replacing in kind the abandoned property.

"Additions and betterments" include additions, structures, facilities or equipment not taking the place of anything previously existing, and the enlargement or improvement of existing structures or equipment or the proper proportion of the cost of new structures of an improved class taking the place of others previously existing. All equipment that is bought, however, is treated as additions and betterments and no allowance is made for replacement. This is presumably because there is already a replacement account provided in the classification of operating expenses.

The elimination of the distinction between additions and betterments is a step in the right direction, in that it is a simplification of the accounting rules. No one who has tried to compare the reports of two or three different roads when they were left to their own devices in accounting can doubt for a moment that some system of accounts should be adopted which shall show expenditures for additions and improvements by themselves, and it is certainly good theory and ought not to be difficult practice to take these expenditures for additions and improvements entirely out of the income account and carry them through to the final balance sheet under the head of "property owned as investment."

Wherever expenditures for new structures or road bed are made, the cost of labor as well as of materials is charged to the proper account under additions and betterments; but where expenditures are made for replacing one structure with a better one, or relaying track with heavier rails, the cost of the material over and above what it would have cost to buy material of the same class as that removed is charged to additions and betterments, while the cost of labor and the amount that it would have cost to replace the material removed with other material of the same grade is charged to income account under the proper expense account. This appears perfectly logical and the facts shown by these accounts are worth showing.

This question of whether the information conveyed by dividing and subdividing accounts is worth the added expense and trouble is the first one that presents itself in connection with the classification now prescribed for additions and betterments. Some hair-splitting questions of classification that are taken up in the present order of the commission are on the face of it not worth while. How much too far the commission has gone in following technical theory rather than common sense it is impossible to say until the present classification has been tried out by the railway companies.

When the 34 primary accounts prescribed in the present classification are examined it seems that the commission had gone pretty far. It is so perfectly obvious that in the past there were any number of companies which made reports to their stockholders meant to give only the information that seemed to the executive officers as proper for their stockholders to see, that any system which tends towards making the published accounts of railways more truly an exhibit of what the company has really been doing is to be welcomed most heartily. As long as it is borne in mind that the accounts are to give information in a simplified form, understandable to a layman, a proscription of uniform systems of classification is highly desirable, but the trouble with the professional accountant is that he becomes so delighted with the medium that he is using to give information that he forgets that it is a medium and makes it an end in itself; he then has to split handspikes to make their cost fit in with his theory. In other words, would it not be possible to give all the information that is worth while by the use of 14 primary accounts under additions and betterments instead of 34, and at the same time save an enormous amount of mental effort on the part of accounting, operating and engineering officers spent in trying to decide which of two or more very closely allied accounts should be debited with some insignificant expenditure.

The 34 primary accounts of the new classification are:

1. Right of way and Station Grounds.
2. Real Estate.
3. Widening Cuts and Fills.
4. Protection of Banks.
5. Grade Revisions and Changes of Line.
6. Tunnel Improvements.
7. Bridges, Trestles and Culverts.
8. Increased Weight of Rail.
9. Improved Frogs and Switches.
10. Track Fastenings and Other Material.
11. Ballast.
12. Additional Main Tracks.
13. Sidings and Spur Tracks.
14. Terminal Yards.
15. Fencing Right of Way.
16. Improvement of Over and Under Grade Crossings.
17. Track Elevation, Elimination of Grade Crossings, etc.
18. Interlocking Apparatus.
19. Block and Other Signal Apparatus.
20. Telegraph & Telephone Lines.
21. Station Buildings and Fixtures.
22. Shops, Enginehouses and Turntables.
23. Shop Machinery and Tools.
24. Water and Fuel Stations.
25. Grain Elevators and Storage Warehouses.
26. Docks and Wharf Property.
27. Electric Light and Power Plants.
28. Electric Power Transmission.
29. Gas-Producing Plants.
30. Snow and Sand Fences and Snowsheds.
31. Miscellaneous Structures.
32. Reconstruction of Road Purchased.
33. Equipment.
34. Interest and Commissions.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY.

The Westinghouse Electric & Manufacturing Co. was taken out of the hands of receivers in December, 1908. The primary cause of the receivership was lack of working capital at a time when business had been expanding rapidly and money suddenly became tight. The first object, therefore, of the reorganization committee was to provide a plan which would assure plenty of cash, and the plan adopted was eminently successful. The balance sheet as of March 31, 1909, shows cash on hand and on special deposit of $11,800,000 and total current assets of $23,600,000. On October 23, 1907, when the company was put in the hands of receivers, the balance sheet showed cash of $1,300,000. The balance sheet of September 30, 1908, after the application of the readjustment plan showed (approximately) cash of $9,000,000; subscriptions to new stock, $6,000,000, of which $2,600,000 was cash already paid on account; there was also a special cash deposit of $1,500,000.

The receivership was expensive, the compensation and expenses of the receivers and their attorneys alone amounting to $266,000; and the expenses incurred in connection with the adjustment of the debt amounted to $460,000. Of the amount charged off for expenses incurred in connection with bond issues of previous years, depreciation of patents, depreciation of various stocks and bonds, etc., amounted to $1,348,000. The book value of the factory plants, franchises, etc., on October 23, 1907, was $21,000,000, while on March 31, 1909, factory plants, machinery, etc., are carried on the balance sheet at $14,600,000; and charter franchises, etc., including insurance and taxes paid in advance, $6,800,000, a total of $21,400,000. Insurance paid in advance in the 1907 balance sheet amounts to $128,000. This, added to the cost of the property and plant and franchises, makes $21,128,000, comparing with $21,400,000 in 1909. Raw materials, supplies, etc., on hand in 1907 were carried at $17,700,000, and in 1909 at $9,960,000.

To raise the cash needed it was, of course, necessary to increase the capitalization of the company to a considerable extent. In 1907 total stock outstanding amounted to $27,900,000 and in 1909 to $40,600,000. Funded debt and collateral trust notes outstanding amounted to $30,000,000 in 1907 and to $31,200,000 in 1909, and there was outstanding, in 1909, $1,400,000 four, five, six and 15-year 5 per cent. notes issued under the readjustment plan. The interest charges were therefore about $1,410,450 in 1907 against $1,689,805 in 1909.

For the year ended March 31, 1907, shipments billed totaled $33,000,000 as compared with $20,600,000 for the year ended March 31, 1909. The cost of sales in 1907 was $28,800,000 and in 1909, $19,950,000. There was therefore a net manufacturing profit in 1907 of $4,200,000 and in 1909 of $650,000. The reduction in total sales is no greater than might be expected and is not a discouraging feature of the report. It would be of interest, however, to know what the unfilled orders are at present, but the report does not give these. General indications are, however, that these orders are large and are probably increasing more rapidly than shipments billed. The dis-

couraging feature of the report is the high cost of production. This, President Westinghouse says, is chiefly accounted for by the small volume of business, the utilization of high priced materials, by the sales at reduced prices and by very considerable extra expenses incurred in completing the departmentalizing of the manufacturing operations of the company and in the rearranging of the machinery. The sales at reduced prices mentioned by Mr. Westinghouse are probably the result of very keen competition that is being carried on with the General Electric Co., the effect of which is shown not only in the Westinghouse report, but also in the General Electric's last annual report.

After adding other income and deducting inventory adjustments, etc., net income available for interest and dividends in 1907 was $4,800,000 as against $1,970,000 in 1909. This left in 1909, after the payment of interest and depreciation charges, a deficit of $920,000. This deficit, together with receivership payments, reduced the surplus as carried on the balance sheet from $11,500,000 in 1907 to $9,000,000 in 1909.

In speaking of the future prospects of the company, President Westinghouse says: "While there has been a decided improvement in the business of the company since the beginning of the year, it has not yet nearly reached normal proportions, although the outlook and inquiries indicate that in the near future the full capacity of the various works will be required to meet the demand."

GASOLENE POWER SECTION CARS.

The abolition of hand cars for section gangs and the use of gasolene-power cars instead, is the latest railway news, and it is really an important advance step in the maintenance of way department. The old primitive mode of conveyance has persisted simply because nothing better has been offered to displace it. But the development of the gasolene engine has now progressed so far that a number of railways realize the advantage of its use on section cars, and many roads have such cars in use; but the Chicago, Milwaukee & St. Paul has taken the lead, and now has something like 100 in service. Certain divisions have been equipped completely with them, including the busiest division, the double track line between Chicago and Savanna, Ill., and some of the light-traffic, single-track divisions.

Although the St. Paul has been using the cars generally only since last February, some interesting figures about their performance, and the benefits resulting from their use, are available. Conditions vary so much on the different divisions that each must be considered by itself. Of the divisions thus far equipped, the one on which the best showing was made is the Black Hills division, 219 miles long, between Chamberlain and Rapid City, S. Dak. This is a new line, less than 3 years old, built through prairie country; and all of the section equipment was new. Conditions were therefore especially susceptible to improvement by any change that would lessen the number of sections, and the amount of equipment. This line at first had 28 sections. With the installation of motor cars this number was cut in two, and the resultant saving on equipment alone, over and above the cost of the motor cars, was more than $1,000 a section. This is an unusually good showing; but there has been no instance on the C. M. & St. P., even on divisions where the men do not live in section houses, but provide their own quarters, where the saving in tools and equipment by reducing the number of sections has not more than paid for the motor cars. On the Bluffs division—the Chicago-Savanna double track—the number of sections was formerly 35, each 4 miles long. This has been reduced to 28.

The saving in labor costs thus far has been only in the smaller number of foremen required. On the Black Hills division, for example, where every other section was eliminated, all the laborers were retained, but only half the foremen were necessary. This gives increased responsibility to the foreman and warrants the employment of better men.

The time saved by men in going to and from work is an important item. On sections 10 miles long this amounts to an hour a man each day, and there is the additional advantage that the men get to their work fresh. On one short branch, which is a single section, high winds prevail to such an extent that it was not unusual for the men to be unable to pump the hand car and be obliged to walk. A gasolene-car has changed this, much to the satisfaction of the men and to the improvement of their work. There are other savings, of course, such, for example, as the number of reports that have to be made out, time books that must be kept, etc. These items amount to a considerable total on a large system. Before beginning the use of gasolene cars the St. Paul had about 1,100 sections. This number will be reduced at least 25 per cent. without delay, and as the use of the cars is extended over all the lines there will be further reduction.

Careful record is kept of the performance of the cars. On the Bluffs division in June the 28 cars ran a total of 7,406 miles on a gasolene consumption of 27.3 miles per gallon. Record is kept of all delays and their causes, and the showing has been excellent, although the cars are new and the designs more or less experimental. Mr. Laas, engineer of maintenance of way, to whom great credit is due for the success of the motor-car undertaking, is preparing printed forms for these reports. Each section foreman sends to the roadmaster at the end of the month a report containing the necesary performance entries for each day in the month. The roadmaster in turn sends to the engineer of maintenance of way a summarized report of the foremen's statements.

Figures on maintenance are not yet available; it is too early. Maintenance will, of course, be an important element with several hundred gasolene cars in service. It undoubtedly will require a good-sized repair plant, inspectors to go over the road, and other things, the expense of which can not yet be reckoned intelligently.

The matter of providing the gasolene supply for the sections required some thought. The plan that was adopted is to have a 50-gal. or 60-gal. tank buried in the ground, and kept locked; and the gasolene is pumped out as needed. Where the sections are close to coaling or pumping stations using gasolene, the supply is obtained there.

This radical innovation on the St. Paul will, of course, be watched by everybody; and the officers who have carried it out will not only merit the commendation of the stockholders, but the gratitude of the section men; which, no doubt, they will receive in hearty measure.

Letters to the Editor.

A BUSY DIVISION.

The Missouri Pacific Railway Company,
Jefferson City, Mo., Aug. 1, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

During the recent high water in the Missouri River territory, the Missouri Pacific Railway handled, in addition to its own trains, the trains of six other roads, between St. Louis and Kansas City, namely the "K" Line, the Burlington, the Santa Fe, the Missouri, Kansas & Texas, the Wabash and the Alton.

The records in this office for the despatching district between St. Louis and Jefferson City, 125 miles, show a remarkably good performance over this district for single track operation. The heaviest days were:

July 10.—	21	passenger,	18	freight.....	39	trains.
" 11.—	34	"	5	"	39	"
" 12.—	24	"	14	"	38	"
" 13.—	20	"	19	"	39	"

On the 10th and 11th we handled these trains with one set of despatchers, working eight-hour tricks through. On the 12th and 13th the district was divided and there were two sets of despatchers. We put a Missouri Pacific conductor and engineer on each foreign train handled, taking entire charge

of and handling these trains the same as our own. We did not have an accident of any kind, and no serious delays.

On the 11th the 34 passenger trains averaged 4 hours 1 minute, and the five freight trains 10 hours, including all delays, in making the 125 miles. The best time was made by Missouri Pacific trains 6, 7 and 10. Each of these trains made the run in 3 hours and 3 minutes. We had two engine failures on foreign line trains, which increased the average time a little, but on the whole, the performance was most creditable, and I think, speaks eloquently for our organization.

J. O. KELLY,
Trainmaster.

RAILWAY FREIGHT RATE MAKING.*

BY SAMUEL O. DUNN,
Western Editorial Manager of the *Railroad Age Gazette.*

A short time ago when the traffic manager of a large railway was testifying in a proceeding before the railway commission of a southern state, the lawyer who was cross-examining him asked him how he knew what was the correct rate to make on a certain commodity between two given points. The traffic manager said he "guessed" at it. For this statement he was ridiculed by the newspapers. It was said that if railway traffic managers just "guessed" what rates ought to be, there surely could be no harm in giving the rate-making power to railway commissions, as they probably could "guess" as well as the traffic managers. But let us see if the ridicule and the inference from the traffic manager's statement were justifiable. If any of my hearers have lived on farms where cattle are fattened for market, they know that there are cattle buyers who will go into a pasture and buy a carload of fat steers "by guess." That is, they will judge by looking them over what they will weigh, and will purchase them without driving them over the scales. So skilful are they in estimating the weight of a steer that they seldom lose any money by buying this way, while it would be very risky for you or me. Now, why is this so? It is because the cattle buyer is an expert at this sort of thing, while you and I are not. He knows what weight and quality of meat are indicated by a given depth and length of neck and body, size of bone, breadth of back, and general conformation, because he has seen thousands of steers of all kinds weighed. When he looks over a bunch of steers he seems to tell intuitively how much he can afford to pay. But, as a matter of fact, his "guessing" is the perhaps unconscious application to each steer of general principles derived from observation and experience. Now, the difference between the "guessing" of an expert and a tyro about the value of a steer is similar to the difference between the "guessing" of an expert and a tyro about what a given freight rate ought to be. The traffic manager's "guessing" is the exercise of judgment, developed to a degree approaching perfection, by long experience, and guided by knowledge of the fundamental principles of rate-making, and intimate acquaintance with the special transportation and commercial conditions under which his road operates. Obviously, no man or body of men with less experience and knowledge is so apt to be right 99 times out of 100 in deciding what a rate ought to be. It is only to correct the traffic manager's mistakes in the exceptional cases when his judgment goes wrong or he is prompted by bad motives that we need public rate regulating bodies.

DISTANCE AS A FACTOR IN RATE-MAKING.

Let us consider briefly some of the principles and conditions with regard to which rates are and ought to be fixed. One fundamental principle is that, other things equal, the rates on any commodity should increase with the distance. All railways, and many railway commissions, have distance tariffs. If the rate be 17 cents per 100 pounds for 25 miles, it will be, perhaps, 20 cents for 50 miles, 24 cents for 100 miles, 40 cents for 200 miles, 56 cents for 300 miles. These are actual figures from the distance tariff of one of the state commissions. The rate does not increase in proportion to distance for two reasons. One reason is that no matter whether a shipment moves a long way or a short way it has got to pay terminal charges at both origin and destination. The longer the haul, the smaller, generally, is the proportion of terminal expenses to the entire cost of transportation, and therefore the smaller should be the rate per ton per mile. The second, and much more important, reason why rates do not increase in proportion to distance is that long distance traffic will not bear as high a rate per ton per mile as short distance traffic, regardless of terminal expenses. The distance tariff rate on corn per 100 pounds for 10 to 15 miles in Illinois is 3.9 cents. The terminal expenses at origin and destination together are about $6 a car, or say, 1.06 cents per 100 pounds, leaving, for a haul of 15 miles, 2.84 cents per 100 pounds as the strictly transportation charge, or .19 cents per 100 pounds per mile. Now, that seems a small rate, but if you applied it on a shipment of corn moving 500 miles, it would amount to 95 cents per 100 pounds, without any terminal charge at all. So you see, regardless of the relative costs of the service, the average rate per ton per mile, especially on bulky, cheap commodities, has got to decline as the distance increases simply because, if the rate per ton per mile did not decrease, few commodities could move long distances. The traffic would not bear the rates imposed.

HOW COMPETITION INTERFERES WITH DISTANCE TARIFFS.

Now, suppose that a man wishes to open a coal mine at a point on the Wabash 50 miles from Champaign, where there is no other railway, and to market the output here. The Wabash, in that case, probably will charge the distance tariff rate for hauling the coal. But, if another railway reached the mine whose mileage from the mine to Champaign was but 40 miles, there would be railway competition, and the Wabash to get any of the business, would have to base its rate, not on its own distance tariff, but on that of its competitor. Suppose, again, that there already is a mine only 30 miles from Champaign on the Illinois Central that is producing the same kind of coal. Then there will be competition between railways and shippers—both transportation and commercial competition—and the Wabash will have to haul coal 50 miles for the same rate that the Illinois Central charges for 30 miles, or the man who has the new mine on the Wabash may be unable to sell his coal in Champaign at a profit, and the Wabash will not get to haul his coal at all.

There is another kind of competition that interferes with distance tariffs. The jobbers at Kansas City and Omaha compete for the business of the same retail merchants in the country towns in Kansas and Nebraska. Now, the jobbers at Kansas City and Omaha can buy their goods from manufacturers in St. Louis, which is 277 miles from Kansas City and 410 miles from Omaha, or from manufacturers in Chicago, which is approximately 500 miles from each of the two Missouri river cities. If rates were based on distance, the jobbers at Omaha would be at a disadvantage in buying goods in St. Louis, but they could get them from Chicago on as low a rate as their competitors at Kansas City could get them from Chicago. In these circumstances there would be a tendency for traffic to be light between St. Louis and Omaha. But, obviously, it is to the interest of the railways running from St. Louis to Omaha for the traffic between these points to be large; and, consequently, they will be disposed to make the same rate from St. Louis to Omaha that other lines make from St. Louis to Kansas City; and, in fact, this is what is done.

WHY DISTANCE SHOULD OFTEN BE IGNORED.

We have seen that rates are prevented from being based entirely on distance by competition between railways, by competition between shippers and by competition between markets. Basing them on distance is still more interfered

*A lecture delivered before the School of Business Administration, University of Illinois.

with by the competition of boats on the oceans, the Great Lakes, the rivers and the canals. The question arises, is there any justification for thus ignoring distance in obedience to the demands of competition? The traffic managers evidently are convinced that there is justification from the railway standpoint. And there is justification from the public standpoint. For in this way the imaginary shipper of coal of whom I spoke in the beginning is given his choice of two roads, instead of being confined to one, which would have a monopoly of his business; the people of Champaign are given their choice of two mines from which to buy coal instead of being confined to one; the country merchant in Kansas or Nebraska is enabled to buy his goods from the jobber at Kansas City, or Omaha, or St. Louis or Chicago, whichever treats him better. The distance tariff, if applied arbitrarily and regardless of conditions, would narrowly limit commercial competition, build up petty monopolies in every community, and be a great obstacle to commercial and industrial progress and prosperity. It would also remove the most powerful stimulus railways now have to improve their service. Competing railways having the same rates between any two points, the largest traffic naturally tends to go to the one that has the most courteous and efficient officers and employees and affords the amplest, safest, speediest and most regular and dependable service; and good, adequate, dependable service is more important than low rates. Low rates are not of much use to a shipper who cannot use them because he can get no cars, or to a traveler who gets killed owing to defective track or equipment. There is but one limit below which the traffic manager will admit that he is not justified in reducing rates to meet competition. He recognizes that, except in very extraordinary circumstances, he ought not to haul a shipment for less than the expense that its transportation *adds* to the other expenses of operating the road. Reverting to the illustration about the man who wishes to open a coal mine on the Wabash 50 miles from Champaign, if it will add $50 to present operating expenses to haul a given amount of coal to Champaign, and owing to competitive or other reasons the railway can get only $49 for the service, it will not take the business. But if the railway can get $51 for the service it may accept the business; for the $1 earnings over the *added* expense incurred will be that much clear gain that can be applied toward maintenance of the roadway, interest, dividends, etc.

LONG AND SHORT HAUL RATES.

A great many persons concede that distance must to some extent be disregarded, but contend that at least there can be no justification for so far ignoring it as to charge a higher rate for a shorter than for a longer haul over the same line, a quite common practice both in this country and elsewhere. But I think concrete illustrations of the practice can be cited that will demonstrate that in many circumstances it is justifiable and desirable. For example, the English railways connecting the Mersey with London, a distance of 190 miles, make a rate of $6 per ton on American beef, which is imported into England and handled by the railways there in very large quantities. On their way to London the trains pass through Cheshire and Staffordshire, and their rate on beef for the hauls from these points—about 40 miles less than from the Mersey—is $9.60 a ton. Naturally, the English farmers complain that they are wilfully discriminated against in favor of American producers. But why should English railways be disposed wilfully to discriminate against English producers? Doubtless they would prefer to discriminate in favor of them, if they could. There are two reasons why the lower rates are made for the longer hauls of American products. One is, that they are transported in much larger quantities, and therefore the roads can afford to make a lower rate on them. The other is, that if a very low rail rate were not made on American meat it would move all the way to London by water, and the railways would not get to haul it at all. The long haul traffic cannot truly be said to be handled at the expense of the short haul traffic, because if the long haul traffic yields any revenue at all over the direct expense incurred in handling it, and the roads would not seek it if it did not—it reduces by just that much the amount that the short haul traffic otherwise would have to contribute toward the expenses and fixed charges of the road. And of course the consumers of meat are benefited by the low rates that the roads make on the longer distance traffic. Of one thing we may be sure, the traffic manager will never make a lower rate for a longer than for a shorter haul if he can help it. The longer haul must cost the railway more, and for obvious reasons the traffic manager will always make a higher charge for the more expensive service when the traffic will bear it.

The local, non-competitive rates on a railway are made and published independently by its own traffic department. The rates on competitive, through business are fixed by the lines individually; but they always are fixed after conference by representatives of the various interested lines in the traffic associations and are published in joint tariffs. There is a large number of these associations and they deal with every kind of traffic, and with traffic handled under all imaginable circumstances. The principal freight associations are the Eastern Trunk Line, the Central Freight, the Western Trunk Line Committee, the Transcontinental Freight Bureau, the Southwestern Freight and Southeastern Freight and the Trans-Missouri Freight.

CLASSIFICATION OF FREIGHT.

If railways hauled only one commodity the entire rate structure could be explained by taking the distance tariff as a basis and showing how it was applied on non-competitive traffic and how rail, water and commercial competition often interfered with its application to competitive traffic. But railways haul thousands of articles; and the student of rate-making has to find out not only why rates vary so widely under dissimilar conditions on the same commodity, but also why they vary widely on different commodities. As distance is the foundation of rates on any particular commodity, so classification is the foundation of rates on commodities in general. The distance tariff is a horizontal arrangement of rates; the classification is a perpendicular arrangement of them.

The United States is divided into three classification territories, the Official, which includes the country east of the Mississippi and north of the Ohio and Potomac rivers; the Southern, including the country east of the Mississippi and south of the Ohio and Potomac, and the Western, including the rest of the country. In each of these territories there is a committee of representatives of the railways that makes the classification applied in that territory. A number of state railway commissions also have adopted classifications applicable to state traffic. The three large classifications differ in many ways, and a committee of railway experts is now trying in Chicago to frame a uniform classification for the whole country. But these classifications are all alike in that, as the word "classification" implies, they arrange all the 4,000 to 10,000 commodities that railways haul into from 6 to 10 classes. The same rate applies for any given distance on all the articles in a given class; but the rate is different for each class. For example, the first-class rate between Chicago and New York is 75 cents, while the sixth-class rate is 25 cents, or 66⅔ per cent. less. It should be added that while the classification committee decides in what class each article shall be placed, it does not decide what the rates on the various classes shall be. The rates on the various classes are fixed by the roads individually, but always after conferences of their traffic men regarding competitive rates in meetings of the various freight traffic associations. Besides the many articles in the classifications there are many articles that are hauled on "exceptional" or "commodity" rates. These rates are lower than the class rates and apply mainly on cheap, bulky and

heavy commodity shipped in carload lots. The major part of the tonnage of this country is carried on commodity rates, although the major part of the traffic in value is carried on class rates.

Now, what considerations determine in what class an article shall be placed, what rate shall be charged on the articles in any class, or whether a given article shall be given a commodity rating? One important consideration is the cost of transportation. If a ton of dry goods is destroyed in a wreck the railway must pay more damages than if a ton of coal burns as a result of a wreck, because dry goods are more valuable. This is one thing that makes it cost more to haul dry goods. Then some articles move in so much larger quantities than other commodities and occupy so much less space in proportion to their weight that a much larger tonnage of them is hauled per car on the average. For example, the average load of dry goods per car the country over is only 12,000 or 15,000 lbs. whereas coal usually is hauled in carloads of 60,000, 80,000 or 100,000 lbs. As the expense of running a train does not vary materially, whether the cars are heavily or lightly loaded, it follows that if commodities that load lightly are to meet their full share of the cost of operation they must pay a higher rate than commodities that load heavily. There are other very large expenses that are incurred in handling the higher classes of commodities that are not incurred in handling the lower grades. They are usually hauled in faster trains. They are also usually handled in less-than-carload quantities, which means not only that they are apt to be transported in service. Competing railways having the same rates between a car that is only half full, but that they must be put through freight houses at the points of origin and destination and frequently be transferred from car to car while en route. Freight houses, representing a large investment and requiring large staffs of employees to handle the goods passing through them are maintained solely for the benefit of commodities that move in less than carload quantities, and rates must be charged on these commodities that will defray the relatively large expense that their movement involves.

"CHARGING WHAT THE TRAFFIC WILL BEAR."

So we find that the cost of the service is an important factor in determining the rates on different commodities as well as on the same commodity for different distances. The rate should be more for a haul of 50 miles than for a haul of 40 miles because, other things equal, the longer haul will cost more. It should be more on shoes than on stone because, other things equal, it costs more to haul shoes. But the traffic manager will tell you that cost of the service to the railway, while an important factor in rate-making, is not, and ought not to be, the most important factor, but that the most important factor is, and ought to be, the value of the service to the shipper. Formerly the traffic manager would have said that rates in this country were based, and ought to be based, on "what the traffic will bear"—on what it can pay without curtailing its movement. But that phrase has been so widely misunderstood and so roughly bandied about, and has acquired so much unjust odium, that railway men are afraid to say it out loud any more.

A little consideration will show that basing rates entirely on the cost of service is utterly impracticable. In a broad sense the cost of any service includes every expenditure that has got to be made to get that service done. The cost of getting the entire rail transportation service done includes return upon the investment in the fixed plant of the railways, the taxes levied on them and the expense of maintaining and operating them. Each of these expenses has got to be met if the service is to be rendered indefinitely. Therefore, each of them is equally indispensable to the transportation of each commodity. If we should add together these various expenses for a year, then subtract the expenses due to passenger service, and then divide the remainder by the number of tons of freight moved one mile in that year, we should have the average total cost of hauling one ton of freight one mile, which in the United States would be, perhaps, 7½ or 8 mills. Suppose, now, that we should then abolish all the existing complicated classifications and tariffs and begin to charge a flat rate on all commodities of perhaps 7¾ mills per ton per mile for all distances. We would then have rates based absolutely on distance and average cost of service. Many millions of tons of coal, ore, stone, etc., are hauled in this country each year for 3½ mills per ton per mile. They are hauled so cheaply because they will not bear a higher rate. The first effect of the application to all traffic of a rate based on the average cost of transportation, therefore, would be that an enormous amount of such low grade traffic would cease to move. The resulting slump in earnings would necessitate an increase in the average rate. But this increase would make the rate too high to be borne by another large quantity of relatively low grade traffic, and there would be another slump in traffic and earnings that would necessitate still another large increase in the average rate. The ultimate result of an attempt to base rates on distance and the average cost of service probably would be that rates would become so high that even the highest class of commodities could not bear them, and there would be little or no traffic or earnings at all.

It would be as impracticable to base rates on the *actual* cost of hauling each commodity as on the *average* cost of hauling all. Fixed charges, taxes, a large part of maintenance charges, the salaries of officers and of many employees, etc.—amounting in all to about 75 per cent. of a railway's outgo—have got to be met no matter how small the traffic is, and cannot be allocated, except in an entirely arbitrary way, among the particular kinds of traffic. And even if all expenses could be accurately allocated among the various kinds of traffic, it would be impracticable to fix rates accordingly, because the rates on low grade commodities and on commodities moving long distances would thereby be made so high that they could not move. The consequent reduction in traffic and earnings would compel advances in the charges on the remaining business, which would cause a further decline in traffic and earnings, and presently we should be as badly off as if we had tried to base rates on the average cost of transportation.

THE PRACTICABLE MINIMUM AND MAXIMUM.

The problem that the traffic manager must solve, then, is to so adjust the rates with reference to both the cost of the service and the value of the service that no commodity will be required to bear so high a rate that it cannot move, and that the earnings from all the traffic will pay all the expenses of the business, including a return on the investment. We have seen that the minimum rate that should be made on any shipment or commodity is one that will slightly more than defray the expense that would not be incurred if that shipment or commodity were not hauled. Now, the maximum rate that can be charged on any shipment or commodity is one that will not exceed the value to the shipper of the service of having that shipment or commodity hauled. Suppose that wheat is worth 95 cents a bushel at a mill near a farm in Illinois and $1 in Chicago. The value to the farmer of the service of hauling a bushel of wheat to Chicago will then be a trifle less than 5 cents. If the road charged 6 cents for hauling it the farmer would realize only 94 cents a bushel in Chicago after paying the freight charge, and the service would be worth less than nothing to him; he could sell to better advantage at the local mill. But if the rate to Chicago be but 4 cents the farmer will realize 96 cents in Chicago after paying the freight charge. The rate will be less than the value of the service to the farmer, and the grain probably will move to Chicago.

How rates are determined by competition of railways and markets, by cost of service and by value of service, is aptly illustrated by the rates on lumber from the Northwest. Until 15 years ago very little lumber was shipped any considerable distance from the great forests in Washington and Oregon.

The freight rates from that section were so high that northwestern lumber could not compete in the markets on the Missouri and Mississippi rivers and farther east with lumber from Minnesota, Wisconsin or the southern states. At that time there was a considerable movement of merchandise to the Northwest. Many of the locomotives and cars that transported this merchandise westward returned eastward with little or no lading. James J. Hill reasoned that it was about as expensive to haul cars empty as to haul them loaded, and that if he could load those returning cars with lumber at even extremely low rates, the earnings from the additional traffic would be almost clear gain to his road. He therefore put in some rates that he thought were high enough to more than cover any additional expense that would be incurred in hauling lumber in the previously empty cars, and at the same time would be low enough for the traffic to bear them. Other roads met the rates made by the Great Northern. The result in the course of years was the development of an enormous lumber traffic from the Northwest.

The lumber traffic grew until the movement of empty cars changed from eastward to westward. It was no longer a question of getting enough traffic to load cars that otherwise would move empty, but a question of getting enough cars into which to load the available traffic. Altered conditions, competitive and of other kinds, enabled the lumbermen of the Northwest to increase the price of their product more than 100 per cent. and to sell it even at points in the East. The traffic managers of the railways argued that owing to these and other changes both the cost to the roads of hauling lumber and the value of the service rendered to the lumber shipper had increased and that on every rational and just principle of rate-making this commodity could and should be required to bear higher rates. In November, 1907, advances in rates of 15 to 20 per cent. were made. The lumber men appealed to the Interstate Commerce Commission. Chairman Knapp and Commissioner Harlan agreed with the traffic managers of the railways, but a majority of the commissioners held against the advance in rates. The railways have now carried the matter into the courts. The incident illustrates how traffic men try to adjust rates to what the traffic will bear. They first made lumber rates low because otherwise the traffic would not move. When the traffic became more costly to handle and capable of bearing a higher rate, they thought the rate should be raised.

"CHARGING WHAT THE SHIPPER WILL BEAR."

While railway traffic managers are unanimous in contending that "value of the service"—in other words, "What the traffic will bear"—is the correct principle on which to make rates, and constantly criticize railway commissions for disregarding it, they are not always consistent in applying it themselves. Take, for example, the rate on packing-house products from the Missouri river to Chicago. Packing-house products are given a preferred service in fast freight trains. They are rather a risky commodity to haul, because fresh meats hung from hooks in a refrigerator car may get to swinging violently when the train is moving rapidly, and throw cars from the tracks. As packing-house products are hauled in cars especially built for this service there is commonly no back loading, and the rate one way has to cover the cost of hauling the car both ways. Owing to their high value these products can stand a high rate. On the basis of cost of service, and that of value of service, therefore, they should be charged a rate as high as, or higher than, the rate on canned goods, for example. But while the rate on canned goods from the Missouri river to Chicago is 27 cents per 100 pounds, the rate on packing-house products is but 18 to 20 cents per 100 pounds. You naturally will ask: "While the railways have been hunting industriously for commodities on which to raise the rates, how does it happen that they have not stumbled on packing products?" Probably the traffic manager of every railway running from the Missouri river to Chicago thinks that that rate is too low. But the packers have a large amount of traffic to give to the railways. It is tolerably well known that they act pretty harmoniously and drive a very hard bargain. Each railway traffic manager feels that if he should suggest an advance in the rate on packing-house products it probably would be only a few days until the amount of those commodities moving over his rails would markedly diminish, while the amount moving over the rails of his competitors would equally increase. I told you in the early part of my paper how traffic managers "guess" what rates ought to be. In this case each traffic manager "guesses" that it would not be good for him or his road for him to "guess" out loud that the rate on packing-house products ought to be higher. You see, there are times when the rate is based, not on what the traffic will bear, but on what the shipper will bear. The present low rate on packing-house products was made a few years ago by a road that was anxious to get more of the packers' business, and could get it only by making a contract to cut the rate in consideration of receiving a certain amount of tonnage. Of course, all the other roads had to meet the reduced rate. *Any* road can reduce a rate on competitive business; but it requires the joint action of *all* to raise it.

RATE MAKING ANALOGOUS TO PRICE MAKING.

What has been said shows clearly that railways do not make anything like a uniform profit from transporting different articles, or from transporting the same article different distances; they make no pretense of finding what is even the approximate cost of each transaction and then adding a fixed percentage to the expense for profit. They make a large profit off one shipment, and a small one off another shipment in the same train, or even in the same car. Those who condemn the railway for so largely disregarding cost of service in fixing rates overlook the fact that this is the all but universal practice of concerns that make or deal in more than one commodity. Does the proprietor of a large department store try to make a uniform profit on all the wide variety of goods that he sells? Certainly not. He could not tell how much it costs him to handle any particular commodity, and even if he could, competition, custom and the fluctuating operation of supply and demand, while enabling him to make a profit of perhaps 100 per cent., or even more, on one article, would force him to be content with a profit of perhaps 25, or 10, or 5, or 3, or 1 per cent. on the other commodities, and even to stand a loss on some.

He aims, not to make a uniform profit on all goods and transactions, but to make some profit on each and a satisfactory average profit on all. And this is precisely what the railway aims to do.

FREIGHT RATES AND COMMODITY VALUES.

We have seen that rates are based on the cost of the service and the value of the service, and we have seen also that the cost of the service and the value of the service both depend, to a great extent, on the value of the commodity transported. Some able economists and traffic managers believe that it would be better for the public if rates were made to bear a more consistent relation to the values of commodities. A railway rate is not a tax, as some have argued. It is a charge, a price, for a specific service. And yet railway charges and the principles on which they should be made resemble, in some ways, taxes and the principles on which they should be levied. It is an equitable rule of taxation that each person should be required to contribute in proportion to his ability toward the support of the government; and it would seem to be also an equitable rule for fixing railway rates that, with reasonable limitations, each shipment or commodity should be required to contribute in proportion to its ability to meeting the cost of maintaining and operating the railway and of paying a return on the investment in it. This would mean, in a general way, that if $1 was charged for hauling a ton of a commodity that was worth $20 a ton, then, other things equal, $10 should be charged for hauling an equal distance, under similar con-

ditions, a ton of a commodity that was worth $200 a ton. In each case the rate would be 5 per cent. of the value of the commodity. If cheap commodity could pay a rate that was 5 per cent. of its value, it would seem that a more valuable commodity could even afford to pay a rate that was 5 per cent. of its value. And if the value of a commodity were doubled, it would seem that it ought to be able to pay a rate twice as high as before, which still would be 5 per cent. of its value. Now, the railway traffic managers, in applying the principle of charging "what the traffic will bear," and not charging what it will not bear, have done something analogous to this. They have made dry goods pay more than coal, boots and shoes more than stone, because dry goods, boots and shoes, owing to their greater value, can afford to pay higher rates. They sometimes have tried to raise the rates on commodities when their value increased, because they thought that the greater value of the commodities enabled them to bear an increased freight charge. But the principle has not been carried out consistently. Freight rates are almost uniformly higher in proportion to the value of cheap commodities than in proportion to the value of valuable commodities. The total cost of transportation of the wool in a $35 suit of clothes from the back of a sheep to the back of a man is only 6 or 7 cents, while the domestic rate on a bushel of wheat from Chicago to New York is 11½ cents. The cost of transportation is 1/9 of the value of the wheat, and only 1/500 or 1/600 of the value of the suit. Now, generally speaking, the so-called "masses" are the largest consumers, proportionately, of cheap, bulky commodities, while the so-called "classes" are the largest consumers, proportionately, of the more valuable articles. Consequently, a rate system that applies higher rates, proportionately, to cheap than to expensive articles, tends to place a greater burden, proportionately, on the poor than on the more prosperous. Regardless of whether present freight rates are, on the average, too high or too low, it would seem that, for social reasons, the railways should be encouraged to make their rates on the more valuable articles higher than they are now as compared with their rates on the cheaper commodities, on the same principle that in taxation we tax luxuries higher than we tax necessaries. On the same equitable principle rates on commodities should be made lower as the prices of those comodities decline, and higher as their prices rise.

TRAFFIC MANAGERS THE AGENTS OF CONDITIONS.

The more one studies rate-making the more is he impressed with the fact that, broadly speaking, the railway traffic manager does not arbitrarily make rates, but, to a large extent, is merely the agent of transportation, industrial and commercial conditions in adjusting them. The seeming, or real, inconsistencies, anomalies and injustices that we frequently meet in classifications and schedules are mainly due to this cause. The student of biology knows that in every animal organism there survive numerous atrophied organs which formerly served highly useful purposes, but, which, owing to changes of the environment in which the animal lives and gains its subsistence, have ceased to be of value, or like the human vermiform appendix, have become even a chronic source of positive danger. The student of jurisprudence knows that in every branch of his science there survive rules of substantive or adjective law handed down from the period of feudalism, many of which are ill-adapted to modern conditions, and others of which demand excision by the lawmakers. Similarly, the student of railway rate-making and railway economics often finds rate adjustments that seem ill-adapted to industrial and commercial conditions, or positively unjust; and he may be disposed at first to denounce railway managers for making such rates. But if he will study the adjustment carefully he may find that when it was first made it was admirably adapted, like some of the feudal rules of law of which I just spoke, to the conditions that then existed. He also may find, as students of jurisprudence often do, that the thing he at first condemned is not near so ill-adapted to existing conditions as at first he thought. And if he pursues the matter far enough he may find, as many who have set out to reform parts of our jurisprudence have found, that the thing he criticises is so bound up with other things of vital importance and value that it cannot be eradicated without doing a great deal more indirect harm than direct good. This explains why traffic managers often seem very slow or reluctant to make changes that to the lay mind seem clearly fair and desirable.

Then, sometimes changing conditions force the traffic managers to abandon old adjustments of rates, just as changing conditions often force the most conservative courts to abandon old precedents or make new ones. Some years ago the manufacturers of cotton piece goods in New England appealed to the railways in that section to make them lower rates to the West. They pointed out that they had to pay for the transportation of raw cotton the long distance from the South to New England, as well as for the transportation of cotton goods from their mills to the West, while competing manufacturers in the South had only a relatively small rate to pay for the transportation of raw cotton to the mills and a relatively low rate to the West on the finished product. The consequence, the eastern manufacturers said, was that they were gradually becoming unable to meet in western markets the competition of their southern rivals. When the eastern roads hesitated about making the reductions asked for the New England manufacturers said that unless they were given lower rates they would have to move their factories to the South. The eastern roads then made the desired reductions. Now, you might say that the eastern traffic managers did not have to make lower rates. But they had either to make them or lose a large amount of traffic. And that is the kind of situation that confronts the traffic manager every day. Each is seeking to get the largest possible traffic and earnings for his own road. But to do that he has got to adjust his rates just as perfectly as possible to the conditions created by the past and present composition of railways, steamships, producing centers and markets. He may charge *all* the traffic will bear; but he is very careful not to charge *more* than it will bear, and *how much* it will bear is always determined by circumstances, most of which are entirely beyond the control of any man or any set of men.

RAILWAY MEN BEST FITTED TO INITIATE RATES.

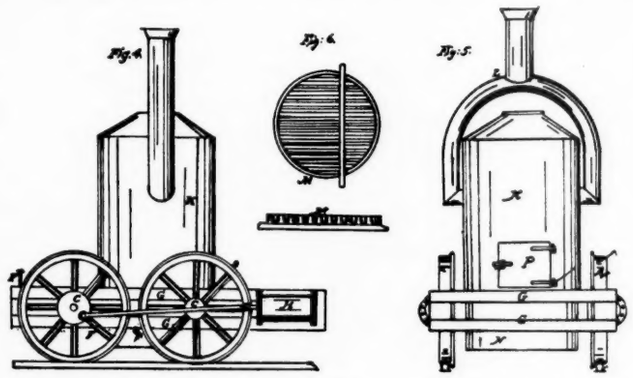
No one will question that railway men are better fitted and better situated to tell what rates *ought* to be, and what they *ought not* to be, than any other persons. Since conditions narrowly limit how much they *can* charge, it seems equally certain that there is no serious danger in letting them have the exclusive power of initiating rates. The danger, it would seem, would be in withdrawing from them the power of initiation and vesting it in railway commissioners, who are bound to act with far less expert knowledge and skill. Among all the 131 railway commissioners, state and national, in this country, there is not one who has had any experience worth mentioning in the traffic department of a railway or of a large shipping concern. Among them all there is but one who had won a reputation before his election or appointment as an expert on railway economics. The average length of time the commissioners have served is but a little over three years; therefore but few of them have had enough experience as commissioners even to understand the principles and complexities of rate-making. The traffic men of the railways often make mistakes. They are often prompted by doubtful, and sometimes by bad, motives. But if we are going to continue to fill our railway commissions with men who at their election or appointment generally have no special qualifications for their duties, we had better restrict their power to changing specific rates after thorough investigation as to their reasonableness, as we have have done with the Interstate Commerce Commission, rather than give them the broad power of initiating rates which has been conferred on, and is often most arbitrarily and unwisely exercised by, the railway commissions of many of the states.

THE NORRIS LOCOMOTIVE WORKS.

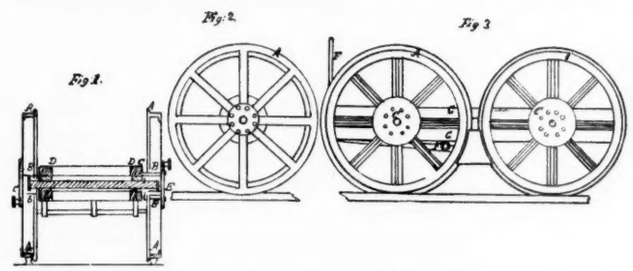
BY C. H. CARUTHERS.

To those in any way connected with American railroads from 1831 to 1868, the name of Norris, and the Norris locomotives, were very familiar, and in fact continued to be so for almost a decade longer. To-day, however, they are but a memory, and many of the younger men on the various lines have but a vague idea, if any at all, of what these names represented to the men who have either passed away or are in the "sere and yellow leaf" awaiting the end of their life's run.

The Norris firm was not only one of the first to engage in locomotive building, but forged rapidly to the front, until by 1861 or 1862, according to its badge-plates, it had probably built more locomotives than any other firm in America, and



The S. H. Long Locomotive. (Patented 1833.)



S. H. Long Locomotive Truck. (Patented Jan. 17, 1833.)

it retained this numerical superiority in construction until about the latter part of 1862, as is shown by the following table:

Date.		Engine.	Construction No.	Builder.
.....	1850	John Stevens	420	Norris Bros.
January,	1850	Indiana	372	M. W. Baldwin
October,	1853	Loyalhanna	649	R. Norris & Son
"	1853	Chester	551	M. W. Baldwin
"	1858	210	912	R. Norris & Son
May,	1859	156	847	M. W. Baldwin & Co.
"	1863	278	1,067	R. Norris & Son
"	1863	258	1,094	M. W. Baldwin & Co.
"	1864	348	1,178	R. Norris & Son
"	**1864**	294	1,283	**M. W. Baldwin & Co**

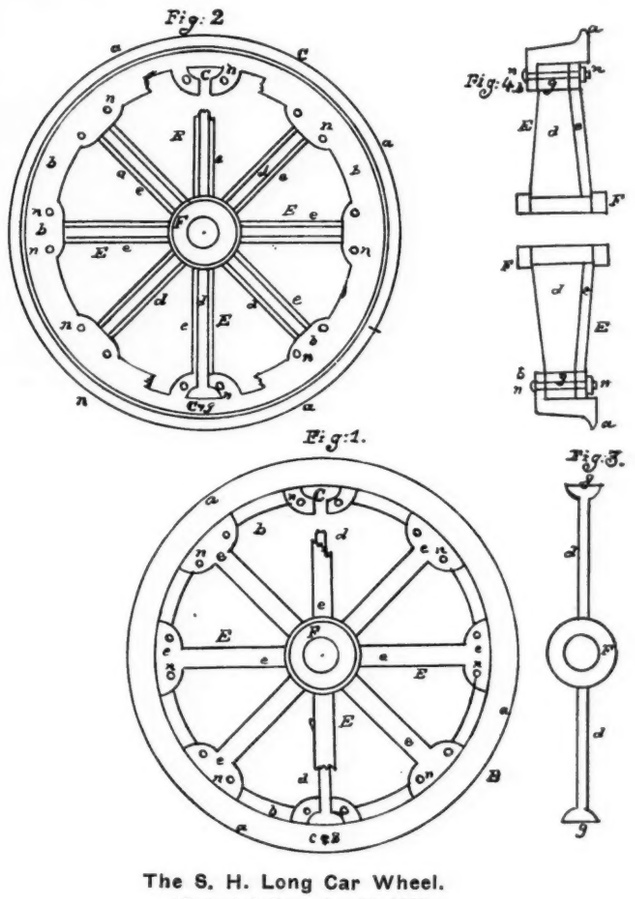
The John Stevens was built for the Camden & Amboy Railroad, and the others for the Pennsylvania.

It will be observed that according to this table the 649th, engine of the Norris works was built in 1853, and the 912th, in 1858; or a total of 273 engines in about five years; yet in 1855 the firm built its 806th engine. Thus it appears that 178 of the 273 were built during three successive years and only 95 in the three years following. This was probably owing to the effects of the business depression of 1857.

The earliest mention which I have found of the Norris plant is that contained in an article entitled, "The Transportation of Passengers and Wares: A Visit to the Norris Locomotive Works," which appears in the "United States Magazine of Science, Art, Manufactures, Commerce and Trade," in the issue of October, 1855. This is evidently one of the most reliable sources of information available in connection with the history of the Norris works, and its compiler states at the outset that, "To make the matter understandable, the author has recently paid several visits to the extensive works of Messrs. Richard Norris & Son, in Philadelphia, one of the largest and most perfect in all its appurtenances in this or any other city."

It is stated in this article, on page 158, that in 1830 Colonel Stephen H. Long, of the United States Army, received letters patent for "certain improvements in the construction of locomotives and other engines," but an error in the printed date is evident, as the records of the Patent Office show no issue of patents on locomotives to Colonel Long until December 28, 1832, followed by another on June 17, 1833. The statement follows that in 1831 Colonel Stephen H. Long, William Norris, General Parker, G. D. Wetherell and Dr. Richard Harlan formed a company called the "American Steam Carriage Construction Company," to built "Locomotors" (as they were then called) from the designs furnished by Colonel Long, and were intended to use anthracite coal as fuel.

The first one was built in the Phoenix Foundry at Kensington, Pa., now a part of Philadelphia, and was steamed up on July 4, 1832, for a test on the Newcastle & Frenchtown Rail-



The S. H. Long Car Wheel.
(*Patented, December* 28, 1832.)

road. It proved an utter failure on account of insufficient firebox and grate area, being obliged to stop at the end of each mile run in order to again raise steam to a working pressure.

No record appears of any attempt to substitute wood for anthracite coal in the engine after this failure, although such change might have produced better results. Perhaps the builders had taken for their motto, "Anthracite or nothing," and, like some experimenters in later years, sacrificed common sense on the altar of a pet theory.

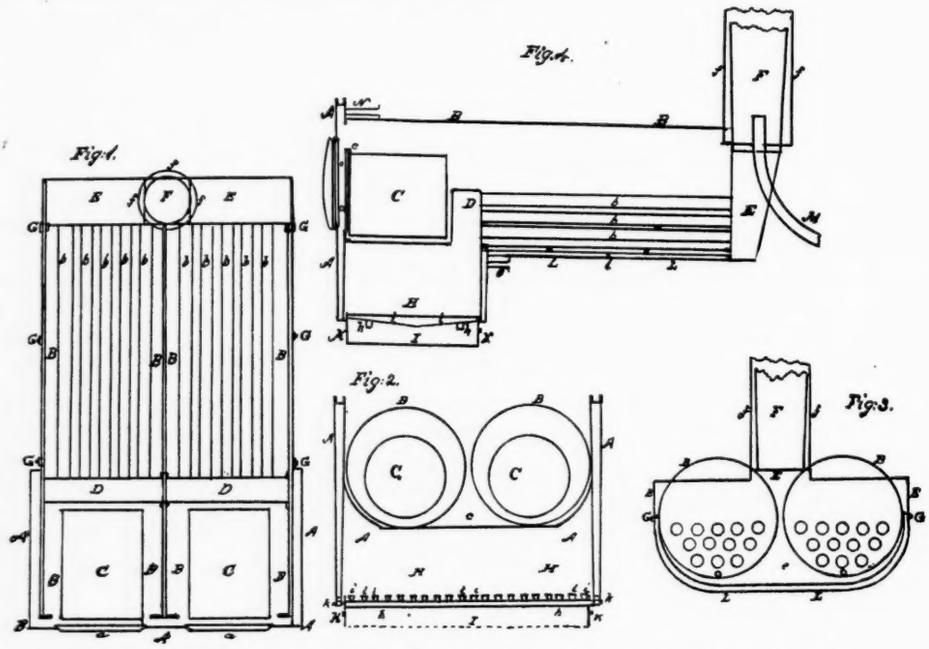
A statement has been published that the original plans of Colonel Long embodied an engine having a four-wheel truck with a single pair of driving wheels, 60 in. diameter, and

two sets of flues placed one in front of the other with a space about 20 in. wide between them to be used as a combustion chamber—an arrangement apparently like that used by Milholland in his first Pawnees—and a fan driven by the exhaust steam to increase the draught at pleasure of the engineman.

Whether this first engine was built on these lines, is not clear from the meagre data available, but in any case the failure of their virgin effort does not seem to have immediately discouraged the members of the firm, as in June, 1833, we learn that "Black Hawk" was completed and afterward burned anthracite coal successfully, first on the Philadelphia & Columbia railroad, and later on the Philadelphia & Germantown road. It is described as having a "detachable" firebox over which extended two cylinders or drums, notched at their centers and having flues 2 in. diameter and 7 ft. long carried from these notches to the smokebox upon which was placed a straight stack rising to a height of 20 ft. above the rail, but arranged with a device to permit lowering it when passing through bridges or under other low places. No other method of producing draught when standing was used.

By this time all the partners except Colonel Long and William Norris had withdrawn their interests. The firm then became known as Long & Norris, and in 1834 built three anthracite coal-burning locomotives for a New England railway. These three performed as well as engines from other works which were using wood as fuel, but they were soon relegated to sand and gravel trains because 'the coal fires required more attention from the enginemen than did fires of wood." Yet their service on these work trains is stated to have been economical!

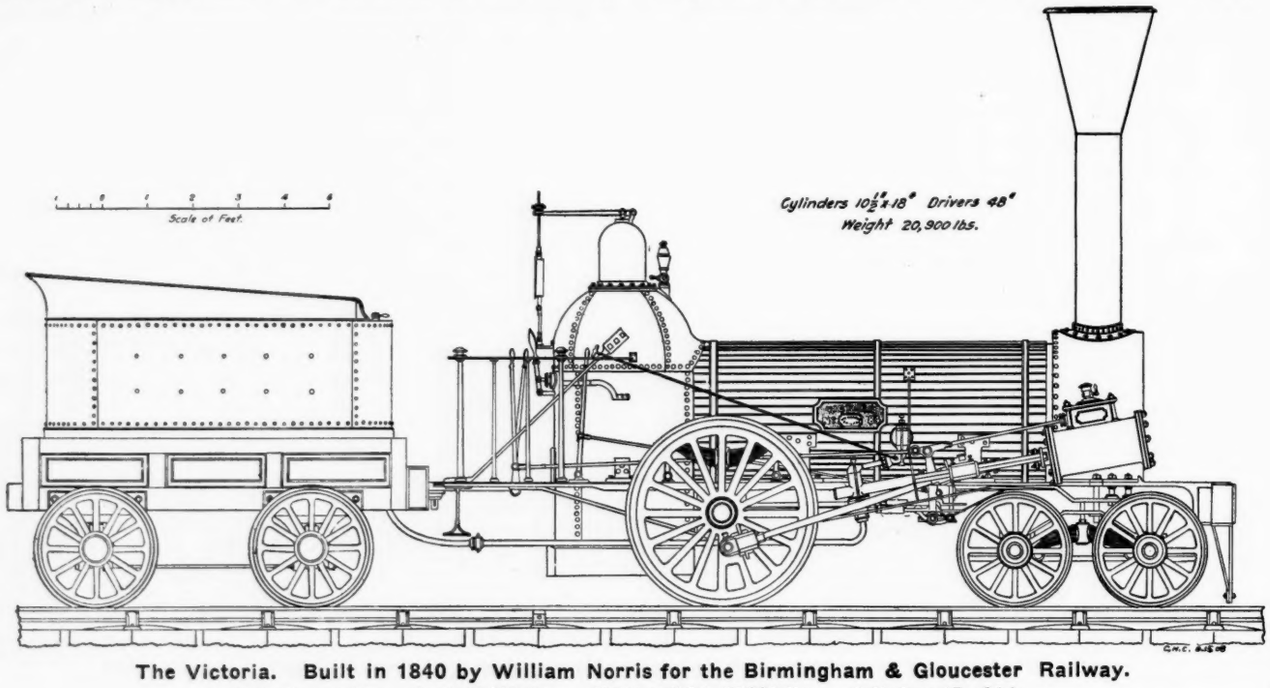
Although the performance of "Black Hawk" has already been recorded as satisfactory, it could not have extended over one year, as the article in the magazine closes its reference to the three New England engines with these words: "and old 'Black Hawk' is still (1855) on its wheels, but in a perfect state of rest in which it has reposed twenty-one years." Probably the same reasons brought about the early retirement from service of this engine which affected the three in the land of the Pilgrims.



The S. H. Long Fire Tube Steam Boiler. (Patented May 6, 1833.)

During 1834 public duties called Colonel Long from Philadelphia, and he sold his interest in the locomotive works to William Norris, who, soon after, completed "Star" for the Philadelphia & Germantown road, where it is said to have been satisfactory. Mr. Norris then abandoned the Kensington location and opened his shop in a small unoccupied stable on Bush Hill, Philadelphia!

His employees were six in number and their united weekly compensation amounted to but thirty-six dollars. Power to

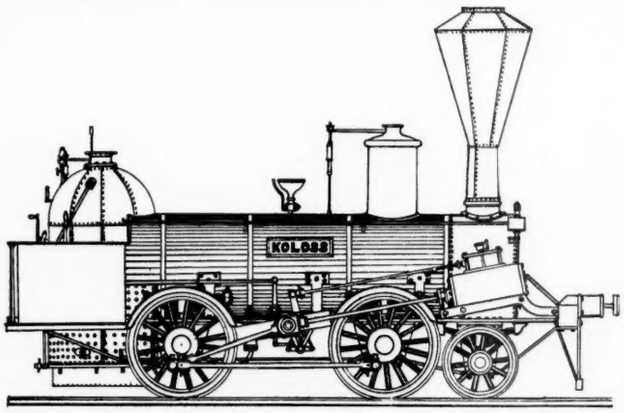


The Victoria. Built in 1840 by William Norris for the Birmingham & Gloucester Railway.
Weight on drivers, about 44,000 *lbs. Total weight,* 67,200 *lbs. Cylinders,* 17 *x* 24 *in.*

drive the machinery was obtained from the adjoining wheelwright shop of Rush & Mulenburg (the first named member of this firm being a son-in-law of Oliver Evans, well known as an early advocate of the locomotive and especially as the builder of the "Oructor Amphibolis" so frequently illustrated in connection with early efforts at steam locomotion), by means of a shaft passing through a hole in the partition wall.

Thus humbly started a plant which rapidly increased in size and in the reputation of its manufactures, until by the time the Civil War was at its height, it had become one of the foremost of the world, with its engines running in many lands.

This plant suddenly burst into prominence on July 10, 1836, when its locomotive, "George Washington," built a short time before, for the Philadelphia & Columbia Railroad, made itself a name which soon became familiar in every civilized country, by hauling a train weighing 19,200 lbs., to the top of the inclined plane at Philadelphia, at a speed of 15 miles per hour, with a boiler pressure of only 60 lbs., and from a direct start at the foot of the plane.



The Koloss, 1842.

Built for coal trains at the locomotive works of Wenzel Gunther, Neustadt, Austria, from rearranged design of a William Norris 4-2-0 engine of 1838.

This performance was especially noteworthy as it had previously been deemed impossible for a locomotive to draw trains up this incline of 2,800 ft. long, and with a grade of 1 in 14, or 377 ft. to the mile. The principal dimensions of the "Washington" were as follows:

Cylinders	10¼ x 17⅝ in.
Driving wheels (two)	48 "
Truck (four)	30 "
Flues	78, 2 in. dia., 84 in. long
Weight, total	14,930 lbs.
Weight, on drivers	8,700 lbs.

The statement has been published that this engine was provided with an attachment whereby a portion of the weight of the tender could be thrown upon the driving wheels when additional adhesion was desired, but this is incorrect. Such a device was, however, designed and used by William Norris on engines built soon after, but the successful results obtained in this instance were attributed chiefly to Mr. Norris' peculiar method of proportioning and setting his valves.

Published cuts of the "George Washington" showing it as an outside connected locomotive are undoubtedly incorrect and could only have been made from pictures of later engines from which the name had been erased.

The statements of the article so frequently referred to thus far, and which bear evidence of having been obtained directly from the Norris people, inform us that the "Washington County Farmer" was built by William Norris in October, 1836, for the Philadelphia & Columbia Railroad, and was considered an improved type on account of having all connections outside of the frames, that is was Mr. Norris' first engine so built, and that it worked successfully on the Philadelphia plane.

The engine next descended the incline, holding the train with reversed valves; stopping at intervals by admitting steam to the cylinders, and after several of these stops the train was started up the grade again, each time without any difficulty. The descending trips were made in from twelve to fifteen minutes. The engine was put into regular service the next day, and on the 19th of the same month a similar trial to that of the 10th was made, to which the public was invited and which was equally successful, receiving the highest praise from all who witnessed it, especially the practical railway men present.

In a very interesting article in the *American Railroad Journal* of July 30, 1836, the editor of that paper writes of this public trial and the following notes are abridged from his account.

The party invited to make the trip arrived at the foot of the plane before six o'clock in the morning, while the rails were wet with a heavy dew. It had been discovered but a short time before that someone, whether maliciously or not could not be ascertained, had blown out the water from the boiler without the necessary accompaniment of drawing the fire, and although sufficient time had not elapsed to do serious injury to the plates, etc., yet as a result some trouble was experienced during the day, from leaking flues. When a start was finally made, it was only to soon stop on oiled rails after running a short distance. It is intimated that both of these hindrances were attributable to employees who had bet rather heavily, and lost, on the occasion of the first trip made on the grade by the engine. However, some sand was scattered along the greasy rails (by hand or a shovel, doubtless, sandboxes being yet in the future), and the engine and its train were then dropped to the bottom of the plane, from which a fresh start was made and the train of two passenger cars containing fifty-three passengers, forming with the tender and its supply of fuel a weight of 31,270 lbs., was drawn to the summit (2,800 ft.) in two minutes and twenty-four seconds, amid the greatest enthusiasm on the part of the spectators and the participants.

The train then continued on its way to Lancaster, stopping at Paoli for breakfast. Here a number of freight cars were attached and some of the party, in order to obtain a better view of the scenery, climbed to the tops of the cars, but were thenceforward obliged to use the utmost caution and "duck" on approaching the numerous covered wooden bridges through which the train was carried across the streams, and before entering which the writer of the article states that the "chimney was lowered respectfully," and that the interior of the structure was soon filled with an annoying cloud of sparks and smoke. Adverse criticism is also made of the practice of forming the double track with only three lines of rails. No mention has ever before been seen by the writer of the present article, of this type of construction having been followed on the Philadelphia & Columbia Railroad, although in later years he has seen it in frequent use on the inclined planes at bituminous coal mines in the Pittsburgh district, the central rail there separating into two at the passing point, and, of course, diverging from a straight line, for a sufficient distance to permit the ascending and descending cars to pass freely. It is probable that the road referred to in the *Railroad Journal* was similarly arranged. One sees little to recommend it, even for those early days, aside from the avoidance of switches at the passing places.

Upon reaching Lancaster, the party was joined by officers of the Harrisburg & Lancaster Railroad, and the West Philadelphia Railroad, and all sat down to a sumptuous banquet at which toasts were drunk enthusiastically to the success of the undertaking and to those who rendered it possible. It seems rather strange that Governor Ritner, the chief executive of the State at that time, should be in Lancaster while this banquet was in progress and not be present at the function, as is stated to have been the case. This may be attributed to the petty political jealousies and intrigues which

characterized the somewhat stormy term of Governor Ritner's incumbency of office. It is stated, however, that he received the party at a later hour.

The return trip to the head of the incline at Philadelphia, a distance of 67 miles over undulating grades, of which some were as heavy as 47 feet to the mile, and around curves of less than 600 feet radius, was made in three hours and eleven minutes, exclusive of stops. The train on this part of the trip consisted of "large" eight-wheel cars and weighed between fourteen and fifteen tons, gross weight, including tender.

The sharpness and frequency of the curves are also alluded to in a sarcastic intimation that their originators desired to convey the impression that such features were the most desirable in railway construction!

The same engine soon afterward drew a train of 22 cars containing a gross load of 119 tons, and it was confidently expected that a maximum load of 150 tons would readily be drawn at a speed of from 12 to 15 miles per hour. The statement is made plainly at this part of the article that the "George Washington" was not provided with the attachment used on some other engines to transfer some of the weight of the tender to the engine.

In a letter to the same journal, in its issue of December 17, 1836, William Norris substantiates the main features of the communication so copiously culled from already, and adds that the "Washington County Farmer" is now in successful operation, and had already drawn a train of 28 cars weighing with their load, 141¾ tons, at a speed of 22 miles per hour over the grades already referred to, ranging from a minimum of 28 ft. to the mile to a maximum of 47 ft. in the same distance. Mr. Norris also adds that the "George Washington" was at the time of writing, drawing trains daily of from 18 to 25 cars, and had drawn a train of 35 cars, 18 of which were loaded to full capacity, 3 half loaded and 14 empty, the whole composing a maximum weight of 137 gross tons.

The reputation gained by these Norris engines on this plane soon reached the ears of railroad managers in Europe, and as a result of a correspondence begun in 1837, an order for 17 engines similar to the "Washington County Farmer" was received by Mr. Norris from the Birmingham & Gloucester Railway of England. These engines were intended to draw trains up the Lickey incline, which was two miles long with a uniform ascent of one in thirty-seven, or 142 ft. to the mile, and which had previously been worked by ropes attached to stationary engines at its summit. The first four were delivered in 1840, and one of them, the "Philadelphia," a 4-2-0 machine with 10½ in. x 18 in. cylinders, 48 in. drivers, and a total weight of 20,800 lbs., drew loaded trains so successfully up this incline, that after the arrival of the remaining thirteen, orders were immediately placed with Mr. Norris for more of the same type, but these orders were soon countermanded on account of English locomotive builders using influence to obtain a governmental decree forbidding the importation of locomotives into England.

Notwithstanding this very unfavorable action of the authorities in giving the home builders such an advantage, the subsequent attempts of these parties to build engines to do the work on the incline as well as the Norris engines, proved such complete failures in each instance, that the railroad company required other home builders to furnish it with engines which should be exact duplicates of the American machines.

Through the courtesy of Herbert T. Walker, I have been permitted to embody in this article the names and numbers of twelve of these engines built for the Birmingham & Gloucester line by Wm. Norris, comprising the following: No. 6, Victoria; No. 7, Atlantic; No. 8, Columbia; No. 9, Birmingham; No. 12, Washington; No. 13, Philadelphia; No. 14, Boston; No. 15, Baltimore; No. 20, President; No. 21, Gwynn; No. 31, Niagara; No. 32, New York. This list was obtained from an official list in possession of the Midland Railway Co. It contains no dates, and, as will be seen by the numerical position of the "Philadelphia," the engines evidently were not numbered in their chronological order. It is also singular why no record has been kept of the entire lot of seventeen instead of only the twelve named above.

The closing of England to American locomotives did not cause the railroad managers of continental Europe to withdraw their patronage, as not only were orders afterward sent from these lines and those elsewhere under their control, until by 1855 100 engines had been shipped by the Norris firm to France, Austria, Prussia, Italy, Belgium, South America and Cuba, but in 1844 William and Octavius Norris were especially invited by the Austrian Government to come to that country and take charge of the Government shops near Vienna. This offer they accepted and remained in charge of the Austrian plant during the five succeeding years, introducing their methods and improvements into all departments. They returned to America with many valuable presents received from the Emperor of Austria, Louis Philippe of France and the Czar of Russia.

It will be appropriate to mention in this connection an article contributed several years ago to an American technical journal by Mr. Hermann Von Littrow, of Neustadt, near Vienna, Austria, on the history of locomotives in that country. The author of the article states that in 1838 the Norris firm sold a locomotive to a railway of Austria and accompanies his statement with a perspective view of the engine. This picture shows it to have been almost exactly like the "Lafayette," built for the Baltimore & Ohio Railroad, in 1837, but it bears the name, "Philadelphia." The article then states that the locomotive works of Wenzel Gunther in Neustadt, were established in 1842 and begun work on this American engine (probably repair work is meant), and taking it for a pattern made some larger 2-4-0 engines for use on the coal trains of the Northern Railway, and near the close of the history adds that in 1861 George Sigl, "owner of the ancient Norris Works" at Vienna, bought the Neustadt plant.

Returning to our records of the plant in Philadelphia, we find that in 1846 Septimus Norris became a partner and the firm name was changed to Norris Brothers, and continued thus until 1851 or 1852. I have seen no records of any Norris engine built during the latter year, but from early in 1853 at the latest, until the final closing of the Philadelphia shops, all badge plates were inscribed, "Richard Norris & Son," H. Latimer Norris having become a partner.

Some authorities state that the plant ceased to build locomotives as early as 1860, but this is certainly an error. I have seen many Norris engines which were built for the Pennsylvania Railroad and its subsidiary lines in 1862, 1863 and 1864. Twenty-two came out in the last-named year marked "W. T. Co." (Western Transportation Co.), and were intended for service on the Pittsburgh, Columbus & Cincinnati Railroad, when the portion of that line across the Panhandle of West Virginia should be completed and unite the road with the Pennsylvania at Pittsburgh. This did not occur until almost a year after the building of these engines, and they ran in the meanwhile on the Pennsylvania Railroad, and this service in connection with the item of their purchase for the P. C. & C. R.R., is mentioned in the Annual Report of the Pennsylvania for 1864.

Norris Brothers also started the Schenectady Locomotive Works in 1848, but I have no data indicating the time at which they withdrew from it.

After closing the Philadelphia plant the old Lancaster Locomotive Works at Lancaster, Pa., were taken by Norris Brothers, either late in 1865 or in the beginning of 1866 (I recall a visit to it in August of the latter year, when it was under their control), and thereafter quite a number of locomotives were built at it until about 1868, when shops also were closed. In 1873 the idle shops at Philadelphia were

purchased by the Baldwin Locomotive Works, and the name of Norris disappeared from the list of active builders of locomotives. These old shops have ever since been an important adjunct to the great plant of their purchaser.

While loitering recently over the collection on the tables of a second-hand book store, I secured a copy of a work published in 1858 by Edwin T. Freedley, entitled "Philadelphia and its Manufactures," in which appears a very excellent article on the Norris Locomotive Works—at that period about in its prime. This article agrees very closely with that in the *United States Magazine* already referred to; and, like it, states that the Norris works in 1858, manufactured its own tires, tubes, springs, wheels, boilers, etc., using best braziers' copper for tubes (flues), best charcoal iron for the boilers, and iron made from the toughest scrap-iron obtainable, for the other parts. It also states that 1,500 hands were employed in the various independent departments of the works, and that up to that year 937 locomotives had been built by the firm, of which 156 were for foreign lands. In verification of this statement is the fact of the engine "Phleger," bearing construction number 912, having been built for the Pennsylvania Railroad in 1858, as before mentioned. Mr. Freedley adds that the average output of the works has been about 40 engines per annum, and that in the year 1858 the cost of each engine ranged from $6,000 to $12,000, and the weights from 44,000 to 66,000 lbs., with a tendency on the part of the companies ordering, to use the larger sizes. He also states that it was rather difficult to estimate the exact cost of each, as many were paid for in whole or in part, by bonds of the purchasing companies.

The predominant features of the Norris engines built between 1834 and 1853 were the following:

Frames with but few exceptions of bar type; boilers of small diameter with 2-in. copper flues, and semi-circular fireboxes of same material. Each firebox was surmounted by a hemispherical dome of "haystack" (Bury) pattern, and this dome was in turn crowned by a much smaller one also hemispherical, and usually made of polished brass or copper, which carried the safety-valve on its top. The whistle on many occupied a position in the center of a cup-shaped fitting of polished brass which was attached to the side of the larger dome.

The smokestacks were generally straight at first, but later were provided with various spark-arresting devices, and from about 1848 the balloon type was generally used.

The smokeboxes were of slightly greater diameter than the boiler, and were square at the bottom which extended a considerable distance below the frames.

The cylinders ranged from 9 in. x 18 in. to 13 in. x 24 in., and generally were placed for outside connections and at quite a steep pitch. They were provided with webs or flanges on their inner sides by which they were bolted to the frames and smokeboxes. As on all early locomotives, no device was used to enable the cylinder cocks to be opened from the foot-plate.

The steam chests each contained a single valve driven by hooks which at first were of "D" type and were thrown in or out of gear by half-moon cams on the reversing shaft, but this type of hook was soon followed by "V" hooks attached to the reversing shaft arms by eyebars fitted at their lower ends with slotted holes to permit the hooks to properly follow the arc described by the pins of the rocker shafts. On the later engines an independent half-stroke "cut-off" was used. This was actuated on a few of the first engines fitted with it, by an attachment to the crosshead, but on all that followed it was attached to an additional eccentric on the driving axle, and in either case was for forward motion only. The cut-off valve was placed directly on the top of the full-stroke valve.

The earlier of these engines were each carried on a four-wheeled truck and one pair of drivers, the latter with the axle set as close to the front of the firebox as would allow the eccentrics to move properly. Later engines had two pairs of drivers and a few were built with three, but all except a few of those with three pairs used the four-wheel type of truck.

Nothing was jacketed except the barrel of the boiler. It was covered with beaded boards painted and held in place by bands of polished brass.

Cabs, cowcatchers and headlights were "conspicuous by their absence." The sides of the foot-plates were protected by a light railing, and a sort of step depended from the front bumper. Sandboxes also were wanting, but came in about 1846. Many were furnished with bells at a very early date.

The first tenders were small and each was mounted on four wheels. Their size increased with that of the engines, and many then were made with six wheels.

From early in 1853 the Norris engines were built of much larger dimensions, and quite a number had slab frames. On some engines these extended throughout their entire length, but in others only as far as the first driving box pedestal, from which to the rear bumper they were of bar pattern.

Auxiliary outside frames of 1 in. x 3½ in. were on nearly every engine built between 1853 and 1856, but were not applied to later engines. During the same period, the running boards of nearly all of these engines had handrails placed along the outer edges, extending almost to the steam-chests. After that time they were carried forward only to the center of the first pair of driving wheels, and by 1858 did not appear at all and only those attached as now, by brackets to the boiler, were used.

The tenders were also further increased in size, and were generally carried on two four-wheeled trucks of a simple side-bearing pattern.

Green seems to have been a favorite color with the Norris people during almost the entire existence of the firm, as but few of its engines appeared in any other hue. Some of these few were painted a chocolate color throughout, and the 22 W. T. Co. engines were uniformly a deep black, with lettering and striping in dull buff shaded with Indian red. Vermillion was also used on many of the wheels after 1853, but green was again used about 1858 for those on some engines using more brilliant colors and landscapes on cabs, sandboxes and tenders, with arabesques galore. Highly polished brass was also used profusely after 1853, even lavishly from 1856 to 1860. Until 1856 hook-motion was the standard valve-gear, but about that year the firm began to turn out engines with shifting links, and generally, if not entirely, adhered to that form of gear thereafter. The hook-motion gears previously referred to have been illustrated and fully described in the *Railroad Gazette* of August 17, 1906, on pages 141, 142 and 143.

Other noteworthy engines from the Norris plant were:

"Lafayette" was built for the Baltimore & Ohio Railroad Co. in 1837, and was substantially "Washington County Farmer" in an enlarged form, although its drop-hooks were actuated by cams instead of eccentrics, which idea may possibly be attributed to Ross Winans who was then prominent in the locomotive development of that company, and who ultimately used cams to work the cut-off on his "Camel" engines. Both "Lafayette" and "Washington County Farmer" were built on almost the identical lines of "William Penn," illustrated on page 167 of the issue of the *Railroad Gazette* for August 24, 1906.

The "Philip E. Thomas," built for the Baltimore & Ohio Railroad in 1838, was apparently the first Norris engine with four driving wheels, and its construction was probably suggested by the very satisfactory performance of an engine built by James Brooks in 1836 with Campbell's type of boiler, a four-wheel truck and two pairs of driving wheels; and, further, by the excellent results obtained from the use of equalizing bars on the four-wheeled Eastwick & Harrison locomotive, "Hercules," which also used two pairs of drivers

in connection with a four-wheeled truck. The "Thomas" had 12 in. x 18 in. cylinders, and aside from the additional pair of drivers and somewhat larger sizes of other parts, was on same lines as "Lafayette."

The "Arrow," a 4-2-0 engine built for the B. & O. R. R. Co., by the Norris plant, in 1839, was at that time considered the fastest locomotive in America. It had cylinders 12 in. x 24 in. and drivers 60 in. diameter.

In the same year another Norris engine, the name of which I have been unable to ascertain, was regularly drawing trains of loaded cars on the Hudson & Berkshire Railroad, over a portion of the line three-quarters of a mile long with a grade of 154 ft. to the mile.

Another of these notable engines of 1840 was placed on the Boston & Worcester Railroad, and regularly drew trains weighing 151 tons exclusive of the weight of the tender and 37 small freight cars over grades of 30 ft. to the mile.

"Chesapeake," delivered in 1846 to the Philadelphia & Reading Railroad, was the first 4-6-0 engine built by the Norrises, and was probably the first of the type built by anyone. Its cylinders were 14½ in. x 22 in.; drivers, 46 in. diameter, and total weight, 44,000 lbs.

It has been stated in some publications that the unique points of this engine were patented by Septimus Norris, but the only record bearing especially upon engines of the same general type is that of a patent taken out by Septimus Norris on September 26, 1854, and the specifications for which limit his claims to a ten-wheel locomotive having three pairs of driving wheels and a four-wheel truck, so arranged that only the rear pair of the drivers are flanged, these with the flanges of the swinging truck keeping the engine on the track and permitting freedom in rounding curves. I have seen Norris engines built in 1862 which had small cast-iron plates attached to the bases of the domes, on which were the words, "Septimus Norris' Ten-wheel Patent, etc." It may be stated in this connection that the firm of Rogers, Ketchum & Grosvenor built at least one ten-wheel engine for the Erie Railroad in 1848, which would indicate that Mr. Norris had no patent on the type at that time. In a letter written to me several years ago by E. J. Roush, who was in the service of the Reading road when "Chesapeake" came out, he states that the engine used no center plate on the four-wheel truck, as the weight was all carried on the drivers, but a large pin extended downward through the frame of the truck from that of the engine and thus enabled the machine to be guided around curves. This engine has been frequently illustrated and described in railroad journals.

(To be continued.)

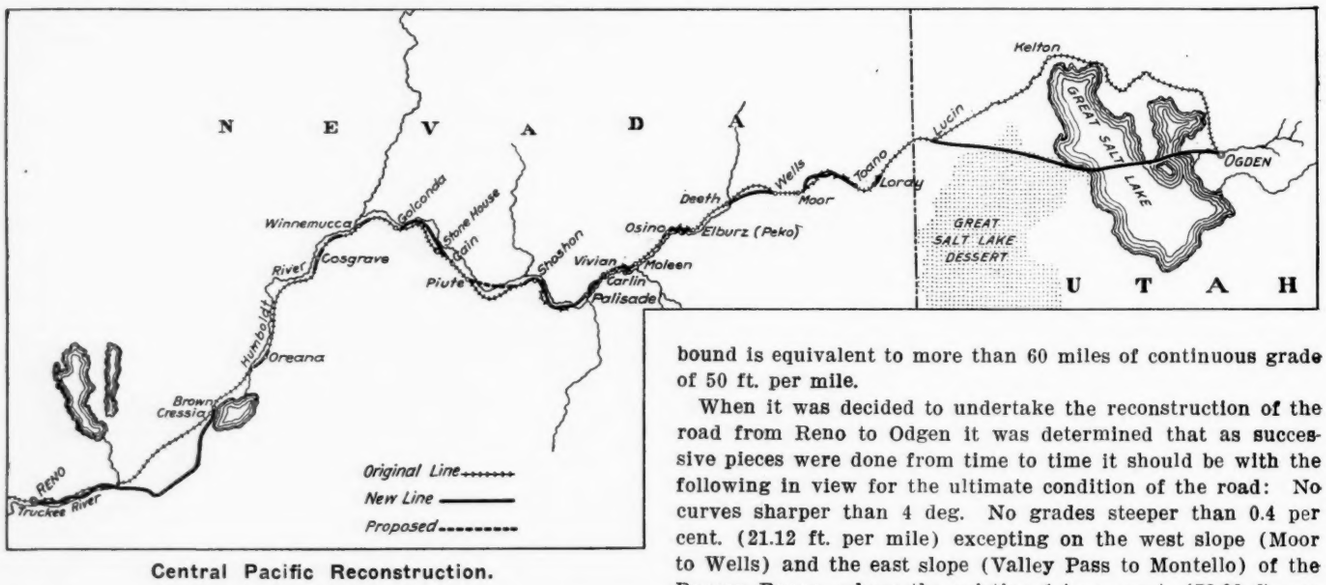
CENTRAL PACIFIC RAILWAY RECONSTRUCTION BETWEEN RENO AND OGDEN.

During 1902 and 1903 the reconstruction of portions of the Central Pacific Railway between Reno, Nev. and Ogden, Utah, including the building of the famous cut-off across Great Salt Lake, reduced the length of the road 47.3 miles; from 589.6 miles to 542.3 miles. During 1907 and 1908, additional reconstruction at Palisade and work in progress near Wells further reduced the length of the road 2.3 miles, making a total reduction between Reno and Odgen of 49.6 miles; from 589.6 miles to 540 miles.

The map herewith shows these reconstructions, including a proposed one extending east from Piute. Omitting this last, the result of reconstruction to date between Reno and Odgen is as follows:

Length of original road abandoned, miles	373.2
Length of corresponding new road miles	323.6
Maximum grade on new road, ft. per mile	21.12
Maximum degree of curve on new road, degrees	4
Total curvature in original road abandoned, degrees	17,045
Total curvature in new road, degrees	4,025
Saving in curvature by new construction, degrees	13,020
Total curves sharper than 1 deg. on road abandoned, miles	74.27
Total curves sharper than 1 deg. on new road, miles	22.32
Grade-rise westward, original road abandoned, ft.	4,550
" westward on new road, ft.	1,538
" eastward on original road abandoned, ft.	4,456
" eastward on new road, ft	1,444
Total decreased grade-rise westbound and eastbound by new construction (each), ft.	3,012

That is, the decreased grade rise both westbound and eastbound is equivalent to more than 60 miles of continuous grade of 50 ft. per mile.



Central Pacific Reconstruction.

When it was decided to undertake the reconstruction of the road from Reno to Odgen it was determined that as successive pieces were done from time to time it should be with the following in view for the ultimate condition of the road: No curves sharper than 4 deg. No grades steeper than 0.4 per cent. (21.12 ft. per mile) excepting on the west slope (Moor to Wells) and the east slope (Valley Pass to Montello) of the Pequop Range, where the existing 1.4 per cent. (73.92 ft. per mile) grades would be retained until such time as increased traffic should warrant an extensive reconstruction to reduce them. All structures such as culverts, bridges, etc., were to be of permanent character. All main line track should be of 75-lb. and 80-lb. steel and thoroughly ballasted.

The relation of the 0.4 per cent. grades to the two stretches of 1.4 per cent. grades on the west and east slopes of the Pequop Range is such that a consolidation freight locomotive with 187,000 lbs. on drivers, fully loaded for its schedule speed on 0.4 per cent. grade, will, with the assistance of two helping engines of the same class, surmount the 1.4 per cent. grade at about the same speed.

On the parts of the original road abandoned there was a free use of grades of from 49 to 90 ft. per mile, where the new road replacing it has a maximum of 21.12 per mile. The original construction of the part of the line from Reno, Nev., to Promontory, Utah, between early March, 1868, and May, 1869—about 14 months—involved some 532 miles of grading, bridging, tracklaying and building of culverts, an average of 38 miles per month. It included building through the Truckee canyon, east of Reno, 24 miles; through Iron Point canyon,

east of Golconda, 7 miles; through Palisade canyon, west of Carlin, 14 miles; through Moleen canyon, east of Carlin, 6 miles; through Osino canyon, east of Osino, 6 miles; over the Pequop Range, with its five summits with broken country between the five divides; over the Ombey divide, and over the Promontory Range. Conditions were such that rapid construction was imperative. This work, under the physical difficulties mentioned, was of necessity done without attempting the amount of grading, tunneling, masonry and bridging required for building a road with the light grades and curves used in the recent reconstruction.

In the course of the reconstruction of the road there were put in, with steel bridges and masonry supports, nine new crossings of the Truckee river; 26 new crossings of the Humboldt river, and two new crossings of the Weber river; also five tunnels aggregating 10,840 ft. in length, the longest being 3,926 ft. All this was in addition to the great task of building the Great Salt Lake cut-off, with which our readers are familiar.

We are indebted to Wm. Hood, Chief Engineer of the Southern Pacific, for the foregoing memoranda.

IMPROVEMENTS IN REFRIGERATOR CARS.

BY JOSEPH H. HART,
University of Pennsylvania.

Within the last decade a considerable impetus has been given to the movement toward increased efficiency in the transportation of perishable fruit requiring refrigeration. This movement toward increased efficiency has covered a variety of developments and has been due to the realization of the great inefficiency of present conditions and their marked inadequacy has often been apparent at certain times. The variety of forms into which this movement has concentrated covers a wide range. Not only is it recognized that the efficiency of transportation is low since the cars were seldom, if ever, completely filled, considerable time wa slost in loading and unloading, in icing and ventilation and the speed of transportation was often necessarily much higher than would be normal with ordinary freight, and this, in turn, resulted in a considerable loss in efficiency in the transportation end. Again, to-day, the effect of the conditions on the value of the perishable product and the effect of prolongation of unfavorable conditions is more generally known and the amount of this loss is often so excessive as to appear appalling to the average man.

Another incentive or agent which led to the development of this movement has been due to mechanical refrigerating machine manufacturers, who, until quite recently, have had their hands entirely filled with ordinary routine business, but as the result of the recent depression have been able to turn their attention to a little more irregular and difficult fields, among which railway transportation occupies an important place. So much for all these causes of this movement. The causes themselves are not important. The results are the main features. The average railway official of whatever character is more or less familiar with the numerous crank developments which have resulted from the attempt to apply mechanical refrigeration in individual car units. Almost without exception these have proved inadequate to meet operating conditions and the movement itself has led to an unfavorable impression among railway men in regard to the utilization of mechanical refrigeration in the direct field of transportation itself. However, quite recently the larger and more efficient mechanical refrigeration interests have paid particular attention to this field and the results obtained are noteworthy. Pre-cooling plants of a variety of types and the natural logical sequence from the set of conditions which are met with in this work are springing up in types of all sizes all over the country, and experimentation in this field with the object of increasing efficiency is a matter of daily occurrence. These plants to date have been either of the individual car cooling type or of the individual product pre-cooling system and exist to-day under municipal, individual, government, and railway control. The statement can be here made that they are universally more or less successful, dependent largely upon their type and the methods used in their operation and maintenance. The most recent development in this field, and one that promises considerable, consists in the utilization of the individual car pre-cooling machine, capable of ready transportation from place to place and quick adjustment, and utilizing both the ice and salt method of refrigeration or mechanical refrigeration for cooling the air.

Attempts have also been made from time to time to develop mechanical refrigeration in train unit lots in preference to individual car systems with considerably more success than has been obtained in the latter development. But one of the most important and far-reaching developments has resulted from attempts to improve the modern refrigerator car itself, as it exists to-day on the majority of railways in this country by the application of sound, scientific and well-known principles to its development. The actual conditions in this case are remarkable to the average refrigerating engineer on even a casual inspection. Ice-box construction, as such, has undergone a scientific development along with all other phases of refrigeration. The modern ice-box or refrigerating apartment, constructed in the average hotel, apartment house, or restaurant, or small business requiring such a feature and utilizing natural ice, is to-day constructed on scientific lines which have developed within the last few decades and this development had completely passed over the refrigerator car system. In fact from a casual inspection of this system throughout the country the conclusion is forced upon the observer that modern principles in ice-box construction have not only been totally ignored but are practically unknown to the manufacturers of refrigerator car units. This statement is made with a full knowledge of the special conditions which are met with in railway transportation, not only in regard to methods of icing and the limitations on ordinary processes which enter in this development, but with an equal knowledge in regard to methods of loading and transportation of the perishable products as well.

There have been two recent improvements in refrigerator cars, one of which is based upon more or less scientific principles and is capable of great development, the other of which is an attempt merely to alleviate conditions which tend to increase the inefficiency existing in the operation of many present systems. Both are considerable improvements in their lines and will undoubtedly prove more or less general in their ultimate application. In order to understand the significance of these two developments a brief review of general ice-box principles as applied to railway transportation will be more or less necessary, as well as a concrete statement of actual conditions in regard to loading and transportation and the losses in efficiency which enter as a result of the necessary use of refrigeration but which can be almost completely eliminated by the application of satisfactory, constructive and engineering details of actual conditions.

Thus in regard to ice-box construction and the essential principles back of its successful operation. The cause of deterioration of perishable products in transportation or elsewhere with lapse of time is due primarily to the generation of bacteria, which process is more or less continuous atall times, but which is greatly augmented in regard to speed and effects resulting from their presence by the maintenance of a satisfactory temperature and moisture as well. The effect of moisture has been greatly underestimated, although its presence in railway transportation has been more apparent and effective in the creation of suitable conditions for bacterial growth on account of the slight motion and vibration of the perishable product during transportation, these conditions not being present under stationary refrigerating conditions. It has resulted in the transportation field in the development of two systems of transportation, one in which ventilation alone

is necessary and the other in which icing and ventilation are both required for the more or less proper preservation of the product. The presence of ice alone in contact with the perishable product does not alleviate to any extent whatever the moisture situation. Moisture is given off continuously from the surface of fruit, meat, etc., and tends to saturate the space. This reacts in turn on the product since a great many of the bacteria are present in the air and pass from it back and forth continuously into the material. In stationary operation of refrigerator boxes, outside ventilation has been practically eliminated with very great saving in the amount of refrigeration required and what is equivalent to that the consequent ice consumption. This has been produced by absolute and complete circulation of the air. This is not present in any of the modern refrigerator cars to anywhere near the extent that it is in an efficient and scientifically constructed ice-box and there is no reason why this should not be the case. In practically every stationary ice-box to-day the ice bunker is placed above the refrigerating chamber which contains the perishable product. Circulation is produced by gravitational means and this is accomplished along scientific principles. A flue connects down one side from the ice bunker to the lowest part of the refrigerating chamber and a similar flue extends on the other side of the ice bunker up from the refrigerating chamber to the top of the ice bunker. The effect of this system is to produce a pronounced circulation in exact accord with the principles used in heating with warm air in the average furnace as existing in the ordinary dwelling. No other openings exist into the ice bunker chamber since they would interfere in their action with the action of the circulating system, and the walls of these flues and the floor of the ice bunker is often insulated to keep the effect of the ice away from the perishable product except where it is wanted through the proper channel. This device results in constant condensation of the moisture produced from the perishable product on the surface of the ice, and the air on entering the cooling chamber to cool the product is unsaturated and absorbs moisture when slightly heated by contact with them with great avidity, keeping the material dry on the surface and hence in a condition where the growth of bacteria is often absolutely prevented. Such a chamber as this can be maintained in a stationary condition with two-thirds of the ice consumption over that present in a poorly constructed type, without proper circulation and will maintain the refrigerator room continuously throughout its entire extent at a temperature of from 35 to 36 deg. and often lower, whereas, in many of the old type stationary ice-boxes a temperature of 42 deg. in the hot summer months was extremely difficult to maintain and the temperature variation between the top and the bottom of the box was often as much as 8 deg.

So much for the effect on efficiency from an ice consumption and refrigerating view-point due to the application of modern scientific principles as utilized in stationary ice-box construction. The refrigerator car is nothing but a stationary ice-box put on wheels, with more or less special attention paid to the loading capacity of the device and the limitation on this capacity due to the presence of the ice bunker. The average refrgerator car to-day has its ice bunker at the end and may or may not be loaded from the side. Originally a partition extended up between this and the perishable product to keep it away from direct contact with the ice and orifices existed at the top and bottom for air circulation. This circulation is in no sense adequate to meet the conditions and in the Bohn type of refrigerator car a series of slats are used to allow, as is thought, more complete circulation of the air in the two chambers. This position of the ice-box at the end cuts in greatly on the loading capacity of the car on account of occupying considerable space which would otherwise be available. The circulation is inadequate, the moisture is always excessive, ventilation from outside sources is more or less necessary at regular stated intervals and conditions have been such in transportation of fruit and a number of other commodities that the top tiers of the car would not be loaded without excessive loss on account of the high temperature maintained there. The ice loss is excessive, since the radiation loss is great, the distribution of load is often unequally distributed throughout the car length, but the main and most important feature is the loss of unnecessary space.

This latter feature has been felt more especially due to the more or less pronounced shortage of refrigerator cars at various times in the year in more or less widely scattered sections of the country, and a movement which appeared to lead to increased loading capacity was one that appealed especially to railway managers at these times. The two improvements mentioned here consist essentially of a movement of the ice bunker to the center and top of the car and a device whereby the partition as used in the ordinary Bohn refrigerator car can be removed and the ice bunker space for additional loading capacity when ventilation only is desired for transportation purposes. The first of these is the invention of C. A. Moore, of Minneapolis, and is a step in the right direction. The ice bunker consists of a more or less flat pan with a false bottom, extending along the top and center of the car and filled with ice from above. The loading is much simpler and more expeditious if the proper facilities are at hand for getting the ice at this point. Numerous openings exist for the fall of the air by gravitational means after it has been cooled and made denser, and gutters exist at the side for the proper drainage of the melted water. As has been said, it is a step in the right direction and results in a more uniform temperature throughout the car, and while allowing the extra capacity at the end where the ice bunker formerly was, also allows the tiers of fruit to be piled higher without danger of spoiling, since the cold temperature reaches a higher level. The proper construction of these ice bunkers must ultimately follow absolutely, however, the development of the stationary type, and have either the hot and cold flue, with the insulation of all other parts of the ice bunker, or else must have a fan system installed for the proper circulation of the air to take the place of this. Such a fan system could be readily connected to the rolling gear but would have the difficulty inherent in this mechanism of stopping operation when the car stopped moving. With proper circulation, ventilation from an outside source is absolutely unnecessary and the time will undoubtedly come in this development when it will be cheaper to use ice at all times than to use outside ventilation when available on account of the extra carrying capacity of the cars in the former condition.

The other marked improvement in the Bohn refrigerator car consists in the substitution of collapsible bunkers. The partition in the Bohn car consists of open work slats made of metallic S-shaped pieces of metal which successfully shut off the ice from the cargo but permit of air circulation.

The improvement consists in fastening this partition to the roof by hinges and allowing it to be drawn up and fastened there when ventilation only is used, thus making the extra space formerly occupied by the ice bunker available for loading purposes. It is undoubtedly a distinct step in advance if the old system of ice bunker is to continue long in vogue, and undoubtedly this will be the case, since all improvements involving large outlays of capital as would be the case in such development are hampered by the existence of older types and their ability to be used in more or less satisfactory operation until they wear out.

A number of other minor improvements such as the adaptation of the Garland ventilator to secure more perfect ventilation while the car is in motion, the placing of a small oil stove under the car to keep the temperature sufficiently high during winter months to prevent further freezing, and a number of other minor developments, of more or less practical significance, are at hand as well. They are all steps in the right direction and are part of the general movement toward in-

creased efficiency in the transportation of perishable products to the same extent that the development of the pre-cooling in the stationary and portable type is in its particular field. In a general way they are competitors and no one who has studied mechanical refrigeration or is at all familiar with its possibilities has the slightest doubt in regard to its ultimate survival in all fields where refrigeration is necessary. However, many of these minor improvements meet existing conditions much more rapidly and with greater efficiency than is present or possible at this time in what may be considered the ultimate surviving type, and they are hence of great interest to all operators in this field.

THE EARNING POWER OF LEADING RAILWAYS.

BY F. E. VOEGELIN.

One picks up the annual reports of the Interstate Commerce Commission and finds that in 1899 a rate of from three to six per cent. interest was paid on 64.43 per cent. of the total funded debt of American railways and an average rate of 4.96 per cent. on dividend-paying stocks, such stocks representing 40.61 per cent. of total stocks. In 1907 a rate of from three to six per cent. interest was paid on 88.17 per cent. of the total funded debt and an average dividend rate of 6.23 per cent. on an amount of stock equal to 67.27 per cent. of the whole. Again in the latest private publication, Moody's "Analyses of Railroad Investments," one finds that the net income on net capital of the Great Northern increased, during the period 1899-1907 from 7.4 per cent. to 13.5 per cent., and of the Boston & Maine from 6.6 per cent. to 7 per cent., in spite of a reduction in the rate per ton per mile from 9.8 mills to 7.7 mills in the case of the former, and from 14.3 mills to 10.8 mills in the case of the latter. The increase in the "margin of safety" for income on leading railway securities, attended by a decrease in revenue per unit of service is quite general, and not merely in the case of one or a few railways.

The papers are full of "crimes" charged to the railways by the general public, pleas and prophecies of bankruptcy by the railways, cries of extortion by shippers. Each supports its tenets and defends its position with reams of argumentative figures. The forces wage battle before commissions and courts, state and federal. Rulings are made by commissions; injunctions are granted and judgments reversed by the courts.

A few months ago President Brown, of the New York Central lines, declared, in addressing the Illinois Manufacturers' Association on "The Railway Problem of To-day," "I doubt if any man in active business life has had to do with a more critical juncture than that through which we are passing at this time."

The layman asks, where is truth? What are the facts? In seeking an answer to these questions the writer has studied the position of "standard" railways to-day compared with their position ten years ago. Eliminating those corporations that have been more pronounced victims of speculative directors and ruthless manipulation, what have been the effects of the last decade on those railways whose management has been more efficient and conservative and limited more closely to the pure production of their commodity for sale, transportation?

The railways taken under consideration are the 22 systems that have complied for over five years prior to 1908, with the laws of Massachusetts and New York defining what railway bonds are legal investments for savings banks in the respective states.

The new laws enacted by the state of New York in 1905 and by the state of Massachusetts in 1908 regulating the investment of savings bank funds in railway bonds are practically uniform in the standard they prescribe, viz., that the railway corporation shall own in fee at least 500 miles of standard gage railway; that the gross earnings shall be at least five times the interest and rental charges; that dividends at the rate of at least four per cent. per annum on the outstanding capital stock shall have been distributed; and that such outstanding capital stock shall be an amount equal to at least one-third of the entire funded debt.

The laws of the two states differ chiefly in two respects: (1) In New York, the railway corporation must have complied with the regulations each year for five consecutive years; the Massachusetts law requires ten consecutive years. (2) In New York, a railway corporation not owning 500 miles of railway in fee, but complying with all other provisions of the law, may be considered as having complied, provided, its annual gross earnings each year have been at least $10,000,000; the Massachusetts law requires $15,000,000 gross earnings annually.

The writer's analyses are applied to these 22 systems, of which three do not own 500 miles of railway in fee, but have complied with the law in respect of gross earnings; namely, the Delaware, Lackawanna & Western, the Delaware & Hudson Company and the Central Railroad of New Jersey.

The period 1899–1907 was marked by a steady expansion of the transportation industry and increase in earnings. It culminated in 1908, in an abrupt decrease in earnings and

TABLE I.—NET INCOME ON NET CAPITAL.
Margin of Safety for Charges on Account of Capital. Earnings per Unit of Service.

Name of road.	Net income on net capital (per cent.) 1899.	1907.	10-year av'ge.	1908.	Margin of safety for fixed charges (per cent.) 1899.	1907.	10-year av'ge.	1908.	Margin of safety for common stock (per cent.) 1899.	1907.	10-year av'ge.	1908.	Average rate, per mile — Per passenger (cents.) 1899.	1907.	10-yr. ave.	1908.	Per ton (cents.) 1899.	1907.	10-year av'ge.	1908.
Penn. R.R.*	8.8	11.6	10.9	....	39	59	52	..	37	42	43	..	1.93	1.92	1.98	....	0.50	0.58	0.56	....
P., B. & Wash.*	8.0	9.0	9.0	....	38	42	50	..	24	50	60	..	1.95	1.93	1.99[1]	....	1.19	.94	1.04[1]	....
Nor. Central.*	8.9	14.3	11.8	....	43	66	60	..	48	40	52	..	2.05	1.99	2.14	....	.49	.60	.59	....
N. Y. C. & H. R.*	6.0	7.3	7.5	....	17	33	29	..	None.	3	23	..	1.86	1.72	1.76	....	.61	.62	.62	....
Lk. Sh. & M. S.*	8.0	17.0	12.7	....	49	60	58	..	11	46	55	..	2.09	1.70	1.99	....	.50	.53	.51	....
Mich. Central.*	5.8	8.0	6.3	....	20	31	23	..	4	20	19	..	2.22	2.05	2.12	....	.60	.64	.62	....
Boston & Maine.	6.6	7.0	6.7	6.7	19	25	19	8	None.	31	1	None	1.71	1.73	1.75	1.71	1.43	1.08	1.18	1.04
N. Y., N. H. & H.	8.4	6.3	7.5	4.9	36	37	39	27	5	15	12	None	1.79	1.62	1.72	1.64	1.41	1.44	1.43	1.41
Del. & Hudson...	8.2[4]	12.4	10.0[5]	....	56[4]	59	58[5]	..	44[4]	41	42[5]	..	2.30[2]	2.14	2.21[3]	....	.79[2]	.66	.69[3]	....
D., L. & W.....	8.7	18.2	12.2[7]	....	44	66	55[7]	..	62	63	62[7]	..	1.56[6]	1.43	1.45	....	.88[6]	.76	.83	....
C. R.R. of N.J...	8.8	11.4	9.2	10.6	27	45	40	42	47	66	60	54	1.59	1.45	1.51	1.41	.88	.84	.87	.84
Balt. & Ohio....	3.8	7.5	6.2	5.6	14	59	49	45	None.	43	50	None	1.73	1.96	1.94	1.89	.39	.57	.53	.57
N., C. & St. L...	6.0	10.8	7.6	7.6	18	55	34	35	70	73	73	45	2.27	2.56	2.48	2.47	.87	.89	.88	.89
Louis. & Nash....	7.3	8.3	8.5	7.4	30	46	46	36	13	45	47	24	2.23	2.35	2.34	2.38	.73	.80	.73	.78
Ill. Central	7.5	10.3	9.1	8.6	35	54	50	45	35	43	40	17	2.01	1.96	1.95	1.86	.69	.58	.61	.59
C., R. I. & Pac...	6.9	5.0	5.3	4.0	43	24	33	6	47	..	..[8]	..	2.03	2.27	2.13	1.89	.99	.95	.98	.94
A., T. & S. Fe...	3.3	6.9	5.6	5.7	32	60	54	48	..	70	64	37	2.28	2.18	2.20	2.10	1.02	.96	.98	.95
Great Northern..	7.4	13.5	11.2	9.1	61	71	70	67	49	43	44	16	2.13	2.37	2.32	2.27	.98	.77	.85	.78
C., B. & Quincy.	10.2	9.8	9.3	8.5	41	55	51	54	26	33	30	27	2.10	2.07	2.07	1.85	.86	.79	.84	.80
Chic. & N.-W....	9.3	10.8	10.2	10.7	46	59	54	56	65	54	62	40	1.94	2.02	1.99	1.81	.87	.90	.87	.87
C., M. & St. P...	7.5	9.0	8.8	9.0	55	63	61	60	62	50	56	36	2.34	2.20	2.25	1.92	.94	.86	.87	.81
C.,St.P., M. & O.[9]	7.7	8.4	8.2	7.4	57	55	56	47	61	37	42	None	2.33	2.27	2.30	1.98	.97	.88	.94	.89
Av. 22 systems	7.4	10.1	8.8	....	37	51	47	..	39[10]	45[10]	47[10]	..	2.02	1.995	2.03	....	.845	.80	.82	...

*Period taken is 1898-1907; year ends Dec. 31. [1] On 9 years only, omitting 1902. [2] 1900. [3] 8-year average. [4] 1901. [5] 7-year average. [6] 1898. [7] 9-year average. [8] No dividends since 1905. [9] Period 1898-1908; 1904 omitted. [10] Average for 17 roads.

curtailment of improvements, owing to the commercial and manufacturing depression.

A glance at Table I. reveals a decrease of 1.24 per cent. in the average rate received per passenger per mile, and a decrease of 5.33 per cent. in the average rate received per ton per mile for the 22 systems, comparing results for 1899 with results for 1907. (Although the ten-year averages are calculated on the decade 1899-1908 results for 1908 are not compared with those for 1899 because they are abnormal, taken as a whole.) Seven companies, receiving an average rate of 2.01 cents in 1899 and 2.18 cents in 1907 show an average increase of 8.46 per cent. in the average rate received per passenger per mile, and fifteen companies, receiving an average rate of 2.03 cents in 1899 and 1.91 cents in 1907, show an average decrease of 5.91 per cent. In freight traffic ten companies, receiving an average rate of 6.97 mills in 1899 and 7.57 mills in 1907, show an average increase of 8.61 per cent. in the average rate received per ton per mile. Twelve companies, receiving an average rate of 9.7 mills in 1899 and 7.7 mills in 1907, show an average decrease of 20.62 per cent.

The average rate per ton per mile for ten roads increased from 6.97 mills in 1899 to 7.57 mills in 1907, while the average for twelve roads decreased from 9.7 mills to 7.7 mills. What is the significance of these figures? Do they mean that the "rock bottom" price at which transportation can be sold is approximately 7.6 mills per ton-mile? That maximum efficiency and minimum cost of production have been reached at that figure? That further reduction of freight rates will prevent the injection of new capital into the railway business for investment and induce the withdrawal of that now invested there?

The theory of economists is, that in an advancing state of capital, population and efficiency of production, the consumer will get the resulting benefits. Generally speaking this has held true in practice, with specific reference to the railway business. The question before the country to-day is, has the point been reached where no further benefits from these causes can accrue to the consumer of transportation? Does the past forecast the future?

Referring again to Table I. it appears that the net income on net capital was greater in 1907 than in 1899 in the case of each company with the exception of the New York, New Haven & Hartford, the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy. The margin of safety for fixed charges was greater in 1907 than in 1899 with only two exceptions—the Rock Island and the Chicago, St. Paul, Minneapolis & Omaha.

(Some explanation of terms used in Table I. may be necessary. "Net Income on Net Capital" is the percentage of net operating income plus income from other sources, distinct from operation, to the net value of the property, including the capitalization of rentals at five per cent. and after the deduction from the total of the investments owned by the property. "Margin of Safety for Fixed Charges" is a percentage indicating the proportion of total net income remaining over after payment has been made of all fixed charges. "Margin of Safety for Common Stock" is a percentage of surplus remaining over after payment of the common stock dividend from the net amount available for common dividends.)

Table II.

22 systems.	1899.	1907.	Per cent.
Average miles of road operated....	59,442	81,075	Inc., 36
Extra main track	8,799	13,752	" 56
Locomotives owned	15,303	23,834	" 56
Freight and company cars	526,506	813,838	" 55
Ton-miles per mile of road 1,292,838		1,938,813	" 50
Average No. tons per train.....	266	383	" 44
Earnings per train-mile.....	$1.64	$2.21	" 35
Average revenue per ton per mile..	.845c.	.80c.	Dec., 5

Table III.—*Average per Mile of Road.*

22 systems.	1899.	1907.	Per cent.
Gross earnings from operation....	$12,877	$19,974	Inc., 55
Net earnings from operation	4,081	6,475	" 59
Fixed charges	3,274	3,761	" 15
Surplus over charges	1,978	4,313	" 118

An analysis of the capitalization, financial policy or management of each individual company is not attempted. Only a general survey can be made, and conclusions be drawn therefrom. If it is a demonstrated fact that, in face of a reduction of 5.33 per cent. in the average revenue per ton-mile, the rate of net income for net capital increased 36 per cent. and the margin of safety for fixed charges increased 38 per cent., it is important to discover the reasons, having in view the effect of a further reduction of freight rates.

The figures given in the three tables, exhibiting physical and income factors are misleading. The conclusion drawn from such *prima facie* evidence is, that if railways can show an increase of 35 per cent. in train-mile earnings, 59 per cent. in net earnings and 36 per cent. in net income on net capital, in face of a 5 per cent. decrease in revenue per ton-mile, they are making too much money. Such a conclusion is open to earnest debate, the writer contending that it is unwarranted, and that a further analysis of income and capital accounts demonstrates that railway capital is not earning all that is accredited to it.

It appears from Table II. that a 36 per cent. increase in the miles of road operated and a 50 per cent. increase in traffic density have necessitated a 56 per cent. increase in extra main track, a 56 per cent. increase in locomotives owned, and a 55 per cent. increase in freight and company cars. During the same period (1899-1907) gross earnings from operation increased 55 per cent., net earnings 59 per cent. and surplus over fixed charges 118 per cent.

How have these results been accomplished? By withholding profits from stockholders and putting them back into the property in order to earn a reasonable return on pre-existing capital. Instead of this reinvested profit yielding a return on itself it struggles to earn interest on capital previously invested. The amount of profits so reinvested is enormous. During the decade 1899-1908 these 22 systems turned back into improvements more than $526,000,000—equal to $724 per annum for each mile of track operated. In 1907 their combined surplus was over $330,000,000 largely represented by profits reinvested in the fixed and floating assets with which the companies did business. In addition to these large appropriations for improvements, there has been a heavy increase in maintenance accounts, compared with other factors, viz.:

22 systems.	1899.	1907.	Per cent.
Maint. of way, per mile of road..	$1,647	$2,504	Inc., 52
Do. of equipment,per mile of road	1,649	2,831	" 72
Conducting transportation and general expenses, per mile of road	5,038	8,211	" 63
Ton-miles 1,292,838		1,938,813	" 50
Number of tons per train.....	266	383	" 44

The essence of economical railway operation lies in getting the maximum amount of work out of motive power, track and equipment. The index of this efficiency is the train load. While it is true that indirect and some direct charges vary inversely as the train-load direct operating expenses in toto bear a more direct ratio to it. It cannot be shown that the cost of maintenance of track and equipment, and of handling traffic, with traffic moving 266 tons in the train is the same as the cost of maintenance and handling with traffic moving 383 tons in the train.

The last annual report of the Interstate Commerce Commission states the following number of railway employees in the United States, per hundred miles of line:

Class of service.	1899.	1907.	Per cent.
General officers	22	35	Inc., 59
Maintenance	271	368	" 36
Conducting transportation	236	332	" 41
Total	529	735	Inc., 39

Increase in operating expenses is due both to the increased number of men required to handle the traffic and to the increase in wages paid per man per day:

Class of service.	1899.	1907.	Per cent.
General officers	$5.80	$6.74	Inc., 16
Maintenance	1.78	2.14	" 20
Conducting transportation.....	2.15	2.52	" 17
Total	$2.66	$3.12	Inc., 17

This increase in the number of employees and the wages paid them has resulted in a total increase in railway pay rolls of 105 per cent. on a 50 per cent. increase in traffic density and a 55 per cent. increase in gross earnings during the decade.

The net capitalization of the 22 companies increased during the period 1899-1907 only 11 per cent. It is instructive to compare this increase with others:

Net capitalization	11 per cent.	Surplus	105 per cent.
Gross earnings	55 "	Traffic density	50 "

Measuring capitalization by the above comparison with earnings, and by the money spent on the property as revealed by the surplus accounts, it would not appear that these railways, taken as a group, are overcapitalized, appraising the stocks at their book values and disregarding their income values.

If, in Table I, $330,000,000 surplus had been included as a capital liability, the average net income on net capital liabilities in 1907 would approximate 9.9 per cent. instead of 10.1 per cent. What would be the effect on the earning power of these companies, considering their outstanding securities, were the fixed and floating assets representing this sum to be lost or withdrawn?

The Interstate Commerce Commission reports the percentage of operating expenses to operating income for the railways in the United States as follows:

1897	67.06 per cent.	1901	64.86 per cent.	1905	66.78 per cent.
1898	65.58 "	1902	64.66 "	1906	66.08 "
1899	65.24 "	1903	66.16 "	1907	67.53 "
1900	64.65 "	1904	67.79 "		

These figures are full of meaning. The lowest ratio during the 11 years was attained in 1902. During the first six years of this period the principle of equalized distribution of motive power and maximum train-loads received its great impetus from railway men. The application of this fundamental principle of railway economics to the handling of an increased volume of business produced by the country's productive expansion made itself felt and was reflected in the operating ratio. Since 1902 the ratio has increased in spite of increased volume of traffic. Using a graphical illustration, the cost of production curve and the volume of production curve seem to have met in convergence at that point and from it to have paralleled each other upward more closely. Will further expansion be attended with an increase in cost of operation equal to the increase in volume of traffic? If so, we cannot look for a further decline in the general level of freight rates.

By 1903 the average train-load of revenue freight had been brought up to 447 tons by the Great Northern Railway Company. In his report to the stockholders in that year, Mr. James J. Hill commented, "this result has been made possible through the large expenditures that have been made for reduction of grades, for more powerful locomotives and for cars of greater capacity." In 1883 the road hauled 341,539,997 tons one mile at an average rate of 19.68 mills per ton per mile. In 1903 it hauled 3,606,835,176 tons one mile at an average rate of 8.57 mills per ton per mile. In commenting on this reduction in rates, Mr. Hill stated, "as the cost of transportation has constantly increased during this period, the above rate reductions have only been possible through the increased volume of tonnage hauled." In 1907 the road was moving 5,426,950,685 tons one mile at an average rate of 7.8 mills per ton per mile, carrying 539 tons per train-mile.

Mr. Harriman has been quoted recently as saying that a further increase in the train-load will necessitate widening the track and rebuilding equipment.

If existing facilities are inadequate to handle the volume of business with the despatch the public demands, when commerce and industry are in full swing, the cost of required improvements will preclude the expenditure being made out of earnings. If money is to come from investors to improve facilities for handling existing business and to make extensions for the development of new business, it seems certain that there must be an increase rather than a further decrease in freight rates.

Does it seem to the hardheaded American business man that a long-established business requiring the reinvestment of 24 per cent. of the profits annually, in addition to heavy maintenance expense, in order to maintain earnings on what we may call the original investment is in a healthy condition? The street railways in the United States bear maintenance and depreciation charges ranging in amount from 16 to 25 per cent. of gross earnings; 20 per cent. is considered a reasonable proportion to keep up the property and maintain its earning power. But we find the steam railways compelled to expend 30 per cent. of their gross earnings in maintenance and improvements in order to maintain their earning power on pre-existing capital and preserve the safety of their securities, with the rates they are permitted to charge.

With freight rates continuing on a downward course and a continuing re-investment of profits, the amount of "surplus" is going to accumulate and the railways will earn a return on only a fraction of the actual amount of money that will have been spent in the original construction of the property and on subsequent improvements.

To illustrate this in figures:

Placing the net capitalization of the 22 system at	$6,282,000,000
Adding the surplus, which we will not consider fictitious, as the appropriations for improvements can be traced into the income accounts, and which, for this group of railways may be considered to have actually increased the potential earning power of the properties.	330,000,000
We have a capitalization of	$6,612,000,000

The situation is, that the income security on $6,282,000,000, representing 95 per cent. of this capitalization, has been strengthened while the balance, $330,000,000, representing 5 per cent., receives no return. If this surplus were compounded at 5 per cent. interest semi-annually, the loss would be startling.

Bonds Decreased; Stocks Increased.

	Bonds 1899 per ct.	Bonds 1907 per ct.	Stocks 1899 per ct.	Stocks 1907 per ct.
Northern Central	65	26	35	74
New York Central	65	59	35	41
Baltimore & Ohio	65	55	35	45
Illinois Central	66	58	34	42
Great Northern	52	36	48	64
Chicago & North Western	68	57	32	43
Chicago, Milwaukee & St. Paul	63	49	37	51
Average, 7 roads	63	49	37	51

Bonds Increased; Stocks Decreased.

	Bonds 1899 per ct.	Bonds 1907 per ct.	Stocks 1899 per ct.	Stocks 1907 per ct.
Pennsylvania Railroad	41	46	59	54
Philadelphia, Baltimore & Washington	35	45	65	55
Lake Shore & Michigan Southern	49	75	51	25
Michigan Central	68	76	32	24
New York, New Haven & Hartford	32	70	68	30
Delaware & Hudson	13	43	87	57
Central R.R. of New Jersey	63	67	37	33
Louisville & Nashville	67	69	33	31
Chicago, Rock Island & Pacific	57	66	43	44
Atchison, Topeka & Santa Fe	46	55	54	45
Chicago, Burlington & Quincy	57	60	43	40
Chicago, St. Paul, Minn. & Omaha	44	48	56	52
Average, 12 roads	48	60	52	40

Proportions Unchanged.

	Bonds 1899 per ct.	Bonds 1907 per ct.	Stocks 1899 per ct.	Stocks 1907 per ct.
Boston & Maine	50	50	50	50
Delaware, Lackawanna & Western	10	10	90	90
Nashville, Chattanooga & St. Louis	62	62	38	38
Average, 3 roads	41	41	59	59
Average, 22 roads	48	46	52	54

What of the future? The reader undoubtedly recalls the congestion of traffic and the difficulty the railways had in handling the volume of business in 1906. When the commercial and manufacturing industries of the country reach full tide of activity again the same conditions will prevail. To provide facilities for the prompt handling of this business,

improvements must be made. Revision must be made of grades and alinement; additional tracks, yards, station and terminal facilities must be provided; equipment must be improved; public demand for abolition of grade crossings and electrification of terminals in cities must be satisfied. If these improvements are made out of earnings, what will be left for stockholders? If they are capitalized, will the present level of freight rates sustain the increased capitalization?

In conclusion a comment is made concerning the financial policies of the railways that have been considered, as revealed by the ratios that stocks and bonds bear to the total capitalization. Seven roads have decreased the proportion of bonds and increased the proportion of stocks; 12 have increased the proportion of bonds and decreased stocks; three have preserved the proportions unchanged.

MALAYAN RAILWAYS.

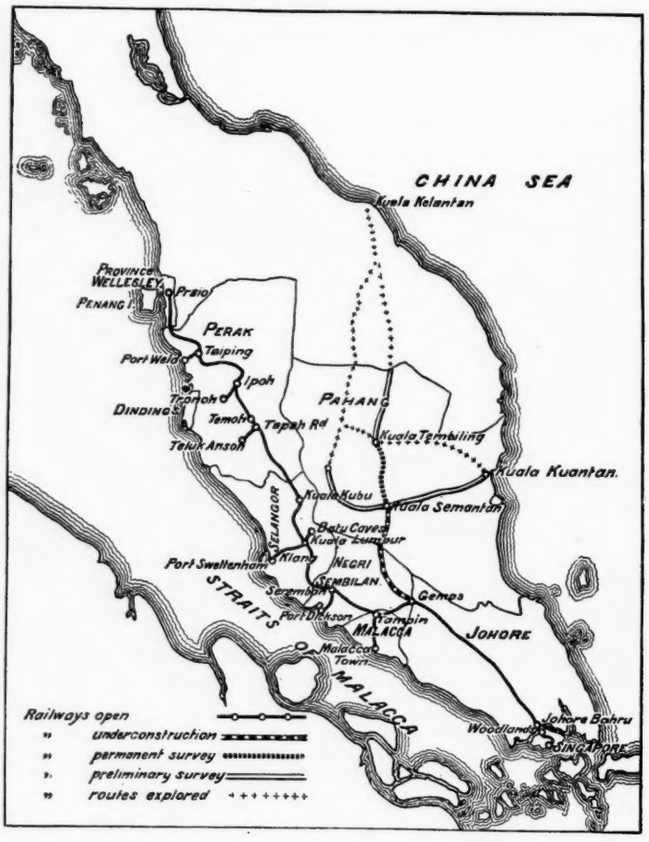
One of the most flourishing and productive of the tropical countries under the rule or protection of the British Empire is that comprised in the Federated Malay States and the Straits Settlements, and these attributes may also be applied to the independent native state of Johore, at the south end of the peninsula, which is intersected by a main line of railway constructed by the government of the Federated States. The Malayan peninsula has for the most part an extremely fertile soil, arising from the decay of the tropical forests for countless ages, these forests still covering all but a mere fraction of the area of the peninsula. In this fraction, however, are grown rice, which is the staple food of the Malays, cocoanuts, coffee, sugar and tapioca, the two latter being chiefly produced by the Chinese, who form half in the numbers, and who furnish much more than half the industry and enterprise of the population. Then there are great possibilities for the extension of the rubber industry, which is already in existence, and the development in mineral production, especially that of tin, of which the quantity is known to be very large, is a certainty of the future. Looking at the enormous area of unused but naturally rich country, under a progressive and enlightened government, the peninsula seems to be especially destined for the absorption of redundant tropical populations of other lands. Naturally, therefore, it is interesting to record what the railway engineer is doing for the necessities, present and future, of this favored country.

The first railways were those from Taiping to Port Weld, opened in 1885, and from Serembin to Port Dickson, from which beginnings followed the main north and south line, as shown on our map, with its numerous branches. The southern portion of this main line through Johore has only recently been completed. It is 121½ miles long from Gemas to its southern terminus at Johore Bahru on the strait dividing the peninsula from the island of Singapore. The line traverses an undulating country, but, apart from the scanty population, the somewhat unhealthy and very wet climate, the construction involved no special difficulties. In order to connect this line with the 20-mile railway crossing the island of Singapore to the town and docks of that name, a wagon ferry service will be established across the strait, which is about three-quarters mile wide, with a tide range of about 12 ft. The slipways will have a gradient of 1 in 30. The travelers on each side, the platforms of which are about 150 ft. in length and carry rails on the level, as well as the winding engines by which these travelers will be raised and lowered on the inclined slipways to suit the varying level of water, were constructed in England. The outer ends of the travelers are provided with a link span to connect them with the steamer deck, with suitable provision for controlling the vertical movement of the steamer during the loading and unloading of the vehicles. The ferry steamers are being constructed locally.

The completion of this wagon ferry will enable freight to be sent without break of bulk from any station on the Federated Malay States Railways to the docks at Singapore.

From Gemas a branch line, about 70 miles long running northwards to Temerloh in Pahang, is in course of construction, and a survey for a further extension of this branch to Kuala Tembiling, some 70 miles further, is in hand. All these lines are on the meter gage, and owing to the increase in the traffic, rails of 80 lbs. are being substituted for those of 46¼ lbs. as originally laid. The total mileage open for traffic belonging to the Federated Malay States government, which some years ago acquired the short private lines, is 454, and that of the Straits Settlements, namely, the Singapore Railway, 20 miles. The former system possesses at Kuala Lumpur, the capital, extensive workshops which are lit by electricity, much of the machinery in them being driven by the same power. These shops, although only lately completed, have already been found to provide inadequate accommodation, so that extension is inevitable.

The map shows the course of three preliminary surveys and four explorations, which indicate the direction which railway



Federated Malay States Railways.

extension in the near future is likely to take, developing outlets on the eastern side of the peninsula.

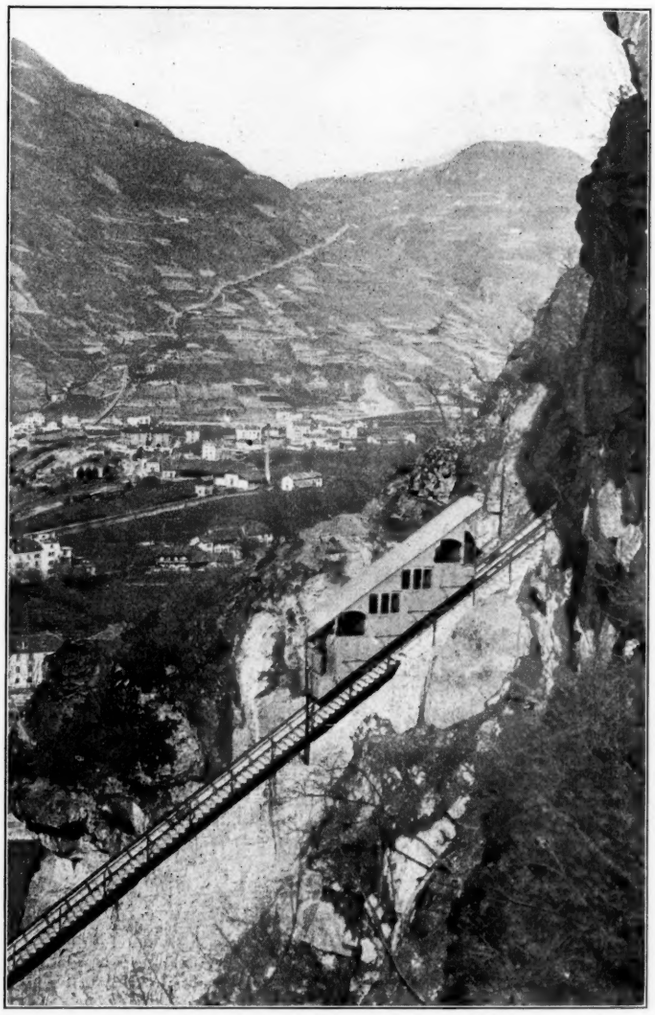
Messrs. Gregory, Eyles & Waring, of Westminster, England, are the engineers for the lines referred to in this article, and we are indebted to their courtesy for much of the information contained in it.

According to a consular report, the first steel plant south of Mexico is being built at Corral, Chile, and is expected to be ready for operation early in 1910. It is to cost $2,000,000 and will have a daily capacity of 200 tons. It is being built by French capital, and it is understood that most of the machinery will come from France. Iron ore from mines five miles from the plant will be carried to the works by overhead cable. It is expected that the opening of the plant will be followed by the development of other industries using steel.

THE STEEPEST PASSENGER CABLE RAILWAY IN EUROPE.

BY E. OMMEGANCK.

The Mendel Railway, with a 64 per cent. grade, and the Vesuvius Railway, with 63 per cent., have up to the present held the record as the steepest passenger cable railways in Europe. Now, however, a railway has been built near Bozen, in the Tyrol, which in its upper section has a grade of over 70 per cent., while the rest is 66 per cent. In spite of these remarkable figures it is claimed that the superstructure and brakes are subjected to far less wear than those of the Mendel Railway, the cars being smaller and there being no compensating rope as on the Vesuvius Railway.



Seventy Per Cent. Grade; Virgl Railway.

The railway is a third of a mile long and leads up to the Virgl terrace, on the Eisach river, in the neighborhood of Bozen. Owing to the exceptional steepness of the mountain slopes and the crowded houses, roads, rivers and railway tracks, which render blasting dangerous, special difficulties had to be overcome in laying out this line. After examining various schemes, an electric wire-rope system was adopted, which cost slightly more than some other systems but made it possible to locate the lower and upper stations in the most advantageous position and to lay the railway in solid ground.

The Virgl Railway starts from the southern end of Bozen, the station partly penetrating into the embankment of the Southern Railway, across which a viaduct had to be built. The latter is a steel metal structure with lowered runway and concrete central pillar. The iron frame station building is connected to this viaduct. The railway runs westerly from the lower station on a 7-deg. curve, and then straight up to the Virgl lookout. Here, in connection with the station building, an extensive restaurant and large terraces have been installed. The lookout has proved a great attraction, and often 1,000 persons are carried per day.

About three-quarters of the track is in mountain cuts, the only considerable elevation being a concrete vault viaduct, 79 ft. long, the abutments of which have a difference of level of 82 ft. While an iron viaduct, with two spans of 72 ft. each, had been at first provided for, the present design was eventually given the preference, though the cost of its construction was more than twice the original estimate. In connection with this imposing structure should be mentioned a road viaduct, close to the lower station, and a viaduct following close upon the large concrete arch, and which also is formed with concrete arches. The gage of the railway is one meter. Beside the stairway, the track in cuts on the mountain side is provided with three steps between each two crossties. The superstructure is designed in accordance with that of most high gradient motor-driven, wire-rope railways. Grooved 54-lb. rails, 33 ft. long are used. In addition to the regular rail joints there is a pair of joint bars at the middle of each rail to hold the rails in place under the severe braking strains.

The driving gear is in the upper station, and operates the cars at a speed of 5 ft. per second, the whole distance thus being covered in five minutes. An alternating current motor generating 55 h.p. is used. Current is supplied at 3,450 volts from a neighboring power plant, and is stepped down to about 550 volts.

A hand brake and an automatic brake are placed on each car. The automatic brake acts whenever the speed of the drive gear exceeds the normal speed of travel by 15 to 20 per cent., whenever the car runs too far into the upper station, and when the current leading to the upper station is interrupted in the transmission line or in the power station. The driver can set the automatic brake at will. In all these cases the current supplied to the motor is also automatically interrupted. Braking tests with fully loaded cars, made on the 70 per cent. grade with a self-acting brake, gave very favorable results. On setting the brake the car would come to a stop within about 4 ft., half of which distance was traversed while the brake shoe was moving into engagement with the wheel. The wire cable has a breaking strength of 110,000 lbs., the maximum traction being 11,000 lbs.

The car is divided into four compartments and two platforms, the outer compartments being open and the central ones closed. The car has seats in these four compartments for 32 passengers.

When the Simplon tunnel was begun plans were made for connecting the French railways with it. There were two of these finally, the northernmost branching in France at Frasne from the line followed by trains from Paris to Lausanne, and reaching the Swiss frontier at Vallorbe, passing nearly 40 miles north of Geneva. This would cost some $4,000,000. The other, leaving a different French line at Lons-le-Saulnier, would cross by some tunneling to a point some 12 miles north of Geneva, which would be a place on the through route. This would cost about $20,000,000. France and Geneva wanted this route, and the Canton of Geneva offered $4,000,000 subscription. The Swiss confederacy preferred the other. Now, after the Simplon tunnel has been opened for years (with apparently little effect on traffic) a contract has been made for the Frasne-Vallorbe line, with some modifications, and the reservation that the traffic may go by the Faucille route, as it is called, through Geneva, should that ever be built, the Swiss government not being held to contribute anything towards its cost.

FURTHER INVESTIGATIONS OF BROKEN RAILS.*

BY HENRY FAY AND RUFUS W. G. WINT.

At the meeting of the American Society for Testing Materials in 1908, one of us presented a paper in which it was shown that steel rails, large calibre guns and other material which contained manganese sulphide in elongated fibres or large masses frequently broke and the fracture invariably started in the sulphide areas before starting into the metal itself. Experimental evidence was given showing the beginning of artificially produced cracks. Cracks thus produced would always start in the sulphide areas, rather than in the steel itself. Since then the investigation has been extended over a larger number of rails which have fractured in various ways. At the present time the authors wish to emphasize the fact that it is not alone sulphide of manganese which is a source of danger, but that other forms of slag are also to be looked upon with suspicion. Before discussing the experimental evidence, we wish to call attention to a paper, unfortunately overlooked a year ago, by Captain Howarth, of the English army. (*Journal of the Iron and Steel Institute*, 1905, p. 197.) At the suggestion of the Ordinance committee he studied the test of pieces from gun tubes, in which were shown greenish colored markings. These markings, identified as silicate of manganese by Mr. Stead, were often associated with sulphide of manganese. Captain Howarth states: "The markings are sometimes visible to the naked eye, but in most instances can only be detected with the aid of a microscope or hand-glass. They vary in color, a sulphur yellow streak with greenish tinge, about 0.03 inch broad, extending across the fracture, being the most common variety. Next in order of frequency come minute leaf-green markings; these are seldom massive, but occur as interrupted streaks in series. In some cases as much as 10 per cent. of the fracture is taken up by them." In eighty-five forgings in 8 per cent. of the muzzle end and 11 per cent. of the breech tests green markings were noted. The muzzle end of the gun represents the upper part of the ingot, and the breach end the lower part. In all cases the author observed that the colored defects appeared most frequently at the bottom of the ingot, and more commonly in large ingots than small ones.

In a paper by Rosenhain, "The Study of Breakages," (*Engineering*, Sept. 11, 1908), he gives the results of the microscopic examination of ruptured gun-tubes and shows conclusively that the cracks extended through the medium of the slag spots. In this he not only confirms the work published in this journal last year, but emphasizes the extreme importance of the absence of slag in high class material. It seems to the author that renewed attention should be directed to the work of Thomas Andrews, and especially to his paper entitled "Microscopic Internal Flaws Inducing Fracture in Steel." The paper is unfortunately written in a very diffuse manner, but gives the results, physical, chemical and microscopical upon a large number of fractured rails, axles, tires, propeller shafts and guns. It is important in that in nearly all the material examined almost without exception there was a considerable slag area in or near the fractured surface, and he says that the internal micro-flaws which are almost invariably present in steel forgings constitute a chief source of initial weakness in axles, rails, shafts, heavy guns, etc., and lead to their sudden fracture, or hasten the deterioration by fatigue.

In his work on steel rails Mr. Job (*Iron and Steel Magazine*, 1905, p. 97) makes a very significant statement, viz.: "Our experience has been that a rail with carbon as low as even 0.33 per cent. will not flow over under exceedingly heavy traffic, provided sound steel is present, with granular form fine enough to render the metal tough and strong, *and in every instance of flowing over, or of breaking down of the side or corner of the head*, we have found the presence of blow holes or other unsoundness near the surface or corners of the head, generally within one-eighth or one-quarter of an inch of the surface, whereas in the cases in which the rails have sustained long and heavy traffic, we have found comparative freedom from such defects."

If he had carefully examined the same specimens before etching he would have been more strongly impressed with the importance of his observation, and also with the important role which slag plays. Indeed, if one consults the literature on the subject of broken steel, of any character, and examines the micro-photographs submitted as evidence, he will be much impressed with the large amount of slag in sight, no matter what the cause assigned for the breakage, whether it be coarse structure, segregation or mysterious.

It is not proposed in the present paper to discuss individual cases of broken rails, as it would lead to much repetition, but to treat so far as possible with definite types of fracture. In the report of last year evidence was produced to show that many crescent breaks were undoubtedly due to cracks beginning in and extending through elongated masses of manganese sulphide. The brittleness of manganese sulphide was also demonstrated. Further it was shown that material which showed streaks and manganese sulphide is invariably associated with streaks, always broke along the lines of these streaks. Since then the extreme brittleness and low tenacity of this material has been shown in many cases and various ways. In addition to the tests which were made previously many new specimens containing sulphide in elongated areas were cut out of rails and subjected to strain. In each case cracks followed through and around these areas, as shown in Figure 1.

Furthermore, it was noticed in many sections that the sulphide was broken at right angles to its direction of extension during the process of polishing, as shown in Fig. 2. This has proved to be a rather common phenomenon and is the result of the various strains to which the sample is subjected in the course of preparation. Another interesting development is in the case of a high carbon steel which was known to have developed fire cracks. After annealing a cross section of this bar was cut and after polishing and etching at various points around the circumference decarbonized streaks were seen in which the sulphide was imbedded in the characteristic way shown in Figure 3. It occurred to us that perhaps the fire cracks might have originated in the sulphide areas. We accordingly prepared a section, carefully marked the areas by punch marks, and then gave it to a man experienced in hardening. The metal on quenching showed cracks running across the surface, each crack coinciding with the sulphide areas as shown in Figure 4. It must be borne in mind that this is only a single observation and we do not wish to be put on record as stating that any other fire crack than this particular one is due to this cause. It is significant, however, that the crack and sulphide coincide, which fact helps the accumulation of evidence in favor of the dangerous character of included slag. A similar study of other fire-cracked material may yield interesting results.

At the meeting of this Society one year ago, Mr. Wickhorst presented a paper upon "Split Rail Heads," and through his courtesy we were able to study this rail microscopically. The whole section was polished to a mirror surface and two things became evident, viz.: the surface was pitted extremely; and the area through which the pitting extended was concentric with the rail section; and the segregation within the area was large. The appearance of the split head and pitted surface is shown in Figure 5. It will be noticed that the pitting is very extensive to the immediate right of the crack, and also somewhat further removed to the left. Microscopic examination showed that the pitting was caused by the tearing out of the

*A paper presented at the annual meeting of the American Society for Testing Materials.

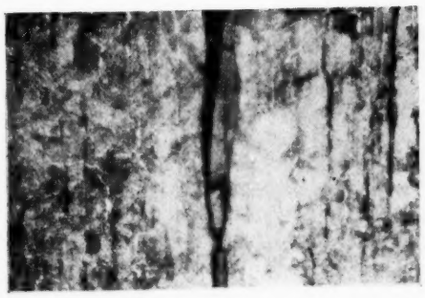


Fig. 1.

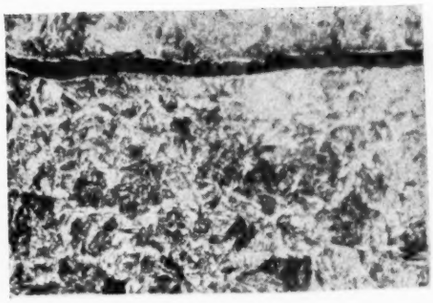


Fig. 2.

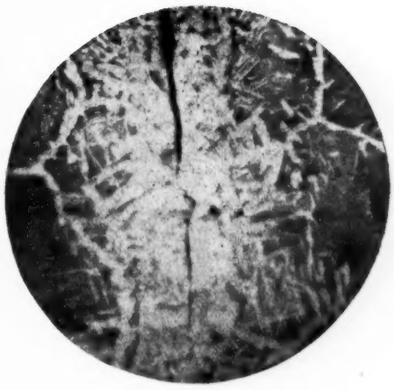


Fig. 3.

Fig. 4.

Fig. 5.

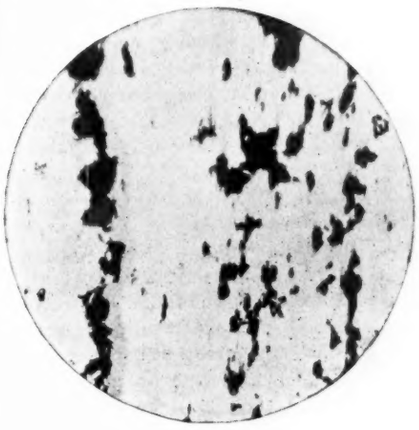


Fig. 6.

Fig. 7.

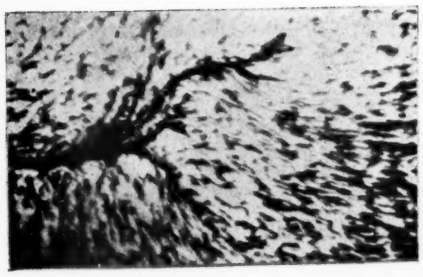


Fig. 8.

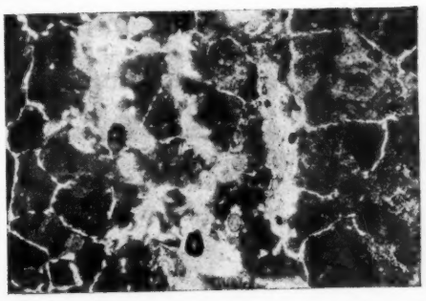


Fig 9.

Fig. 10.

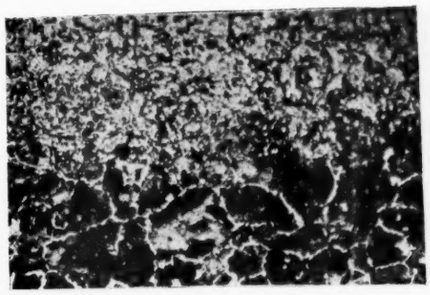


Fig. 11.

Fig. 12.

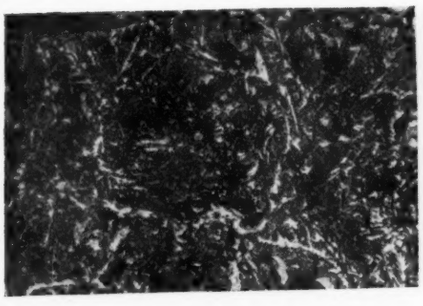


Fig. 13.

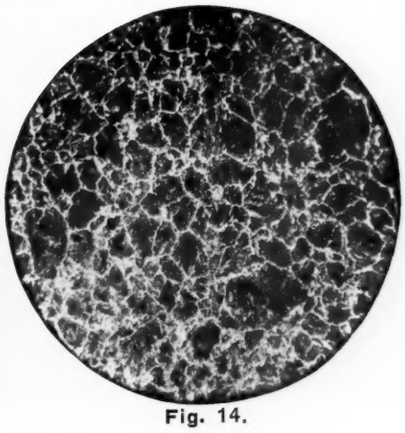


Fig. 14.

slag which had been present in very large quantities. Much still remained and was of the characteristic dove blue color of sulphide, although we prefer to refer to it in this case as simply slag because of the different appearance in different parts of the rail. Mr. Wickhorst reports segregation of carbon, phosphorus and sulphur, and it is very significant to note that the sulphur in some places ran as high as 0.152 per cent. and that manganese was high where sulphur was high. This would indicate sulphide of manganese, but it is believed in this case that the sulphide is mixed with other forms of slag. Much of the slag was removed and the general appearance of the polished surface is shown in Figure 6. This appearance is characteristic of the whole of the pitted area of the head. In the smaller ends of the split portion some slag is seen in place and its characteristic appearance is shown in Figure 7. Whether or not sulphide of manganese, or some other form of slag, was the ultimate cause of this particular split head we are not prepared to say, but we can strongly express the opinion that it was at least a contributing cause.

This opinion is strongly confirmed by our examination of other split heads, which shows in common the following facts:

1. Excessive slag (manganese sulphide, silicate, etc.).
2. Segregation of slag concentric with the section.
3. Remnants of slag in the large split portion of the head.
4. Slag in those areas where flow of metal has occurred, or where microscopic cracks have developed.

It is quite impossible from the evidence which is obtainable to state with any definiteness the exact cause of fractures of this character. It is highly probable that blow holes or pipes, imperfectly welded, are primarily the cause, but if so there is always associated with this a large amount of slag. It is conceivable that the presence of slag may alone account for fractures of this kind, although it will require much more experimental evidence to prove this conclusively.

Cracks invariably begin in and follow from one slag area to another. This may occur either on the surface or well within the metal. In a number of split head sections, or sections of rails in which there has been flow of metal, many small cracks have been observed and almost invariably these cracks will follow through slag or end in it. The characteristic appearance is shown in Fig. 8. On the contrary, very rarely in the case of flow of metal is the metal free from slag. These observations fully coincide with those made by Mr. Job, previously quoted. Further cracks which have developed within the metal due to shrinkage strains, such as may be found in the interior of the ingot, will follow ferrite and slag areas. Such areas as shown in Fig. 9 are very common, and it is through such areas that interior cracks develop. The segregation of the ferrite weakens the metal and if a crack once starts in either ferrite or slag it will follow these areas. The slag shown is manganese silicate. Flow of metal and microscopic cracks in such areas are very common and in practically every case examined the crack extends into a slag area. Whether or not such cracks are sometimes developed during the process of rolling and the slag injected at this time it is impossible to state, but it is believed that this sometimes happens, in which event the slag and cracks are invariably associated.

Hard spots in broken rails have been observed and are apparently due to one of three causes:

1. Imperfect mixing and solution of the ferro-manganese.
2. The hardening of the surface of the metal due to slipping of the driving wheels.
3. Segregation in alloy steels.

The first cause is not a common one, but occasionally one may meet with undissolved ferro-manganese, which is easily identified by the free cementite. The cementite being very hard gives rise to a brittle spot which is usually detected during the process of machining the sample.

The second cause is also not a common one but is more frequently observed. The hardened surface is the result of slipping of the locomotive driving wheel. In Figure 10 is shown a section taken from the head of such a rail. The section was polished and etched with Kourbatoff's reagent. The microstructure of the junction of the hard and soft areas is shown in Figure 11. The mechanism of the fracture produced in such a rail is comparatively simple. The upper layer being extremely hard and brittle soon develops a large number of fine hair cracks and some of these cracks ultimately develop into and extend into and through the soft material. If the soft material happens to contain areas of sulphide or silicate of manganese the propagation of the crack will be more rapid.

The third cause for hard spots is due to the imperfect melting of the alloy to be added. This is in some respects similar to the first cause, but inasmuch as manganese is a regular constituent of rail steels it was thought better to separate these two causes. We had occasion to examine several nickel steel rails which had broken in service and which were so very hard that they could not be machined. By sawing through the softer parts some sections were obtained by knocking off the harder parts with a hammer. In one of these rails were found streaks of very hard, medium hard and soft metal. These streaks were not only shown fairly well in the polished metal but were brought out strongly on etching with 4 per cent. nitric acid in ethyl-alcohol. The very hard streaks showed martensite with spots of troostite, as shown in Figure 12. In the medium hard streaks the structure was distinctly sorbitic, as shown in Figure 13, and also Figure 2, which was taken from the same rail. The structure of the softer portion of the rail is shown in Figure 14. It will thus be seen that this rail is a conglomerate mixture of martensite, troostite, sorbite, pearlite and ferrite and long streaks of manganese sulphide. As the streaks were narrow and unevenly distributed it was impossible to machine them out for analysis, but it is firmly believed that this lack of uniformity is due to segregation of the nickel.

Guillet has shown that beginning with about 6 per cent. of nickel martensite makes its appearance and we undoubtedly have a similar case here. As the soft steel contains about 3.5 per cent. nickel the sorbite portion being a transition form between martensite and pearlite must contain less than 6 per cent. and more than 5 per cent. nickel. This assumption would seem to be confirmed by a similar experience with a nickel steel casting which showed a very hard area. The surface showed the martensite structure after thorough annealing. Inasmuch as the percentage of nickel reported was 3.5 per cent. it was considered desirable to determine the nickel immediately below the hard surface. Accordingly drillings were obtained and the nickel was found to be 5.86 per cent. in the fairly soft area.

As a result of our investigations on fractured material, rails, axles, etc., covering a period of several years, we are deeply impressed with the important role which slag plays in every case. All of the work which has been done since the meeting a year ago has served to emphasize and confirm the views then expressed. These views have received strong support in the work of Rosenhain, Captain Howarth and Job. Furthermore one of us will in the near future bring out further evidence.

In regard to a remedy we would like to emphasize those previously suggested and we will adhere to this view until they have been given an impartial trial. We would again suggest the following as being the most important:

1. A specification asking for lower sulphur.
2. More time between the addition of ferro-manganese and pouring of the metal into the ingot mold.
3. Bottom pouring.

In addition, we believe that electric refining will remove many of the difficulties, but it must not be assumed that this is a general panacea. Bad steel can be produced just as easily in an electric furnace as by any other method, but under competent control the process is capable of producing valuable results.

THE ELECTRIFICATION OF THE SOUTH LONDON LINE OF THE LONDON, BRIGHTON & SOUTH COAST RAILWAY.

The line at present being electrified is known as the South London line, and extends from Victoria to London Bridge, *via* Battersea, Wadsworth Road, Clapham, East Brixton, Denmark Hill, Peckham Rye, Queen's Road, Old Kent Road, and South Bermondsey, and is just under nine miles long.

Inside Victoria station seven lines will be equipped with overhead construction, giving access to five platforms, and in London Bridge station, five lines will be similarly fitted.

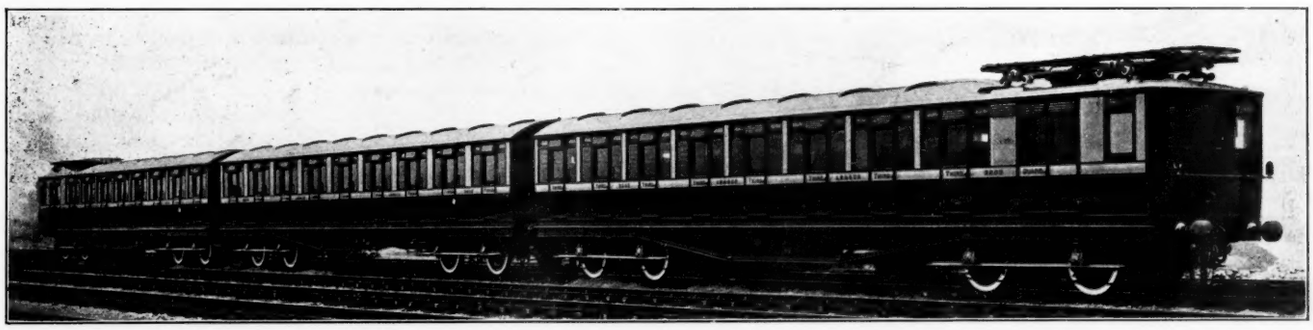
The time at present taken for steam trains from Victoria to London Bridge, is 36 minutes; electric traction will reduce this to 25 minutes, and it is intended to run approximately a ten minutes' service.

At the present moment the section from Battersea to East Brixton is completed and the equipment has also been extended as far as Peckham Rye. It is over this section that the experimental running will take place and that the tests will be made in order to verify the very stringent guarantees given by the contractors.

The repair shops at Peckham Rye are in telephonic communication, by means of special circuits, with the electric switch cabins which are situated at, or near each of the stations and from which the electrical operation of the whole line can be controlled. The apparatus accessible ordinarily in these cabins is entirely on the low tension side, and obviates therefore any risks in operating. It is designed to be of the simplest form possible, so as to enable the ordinary station staff to work it should this at any time be found necessary. The repair shops at Peckham Rye are also in telephonic communication with all the signal cabins and by this means can be kept in constant touch with the operating staff.

The electric current for operating the trains is obtained from the London Eectrical Supply Corporation at Deptford, and is transmitted by duplicate mains to the switch cabin at Queen's Road, where are the meters which register the amounts consumed by the Brighton Railway Company. From here, duplicate feeder cables are taken to the Denmark Hill switch cabin, which is the principal one on the line, and in this are situated the various recording instruments required by the Board of Trade.

As is well-known, the system of electric traction adopted is the single-phase a.c. high tension, involving the use of an overhead conductor. This system was decided on after the most careful consideration, and since its adoption the majority of railway engineers throughout the world have concluded that it is the most satisfactory one for electrically operating any portion of a main-line railway, which may ultimately be converted entirely.



Electric Train; London, Brighton & South Coast Railway.

In consequence of the very high pressures at which the current is supplied (6,700 volts) only 100 or 140 amperes are required per train, and the circuit breaker in no case need be set at much over 500 or 600 amperes, so that this will be the maximum current under any circumstances, which could do damage without the circuit being automatically opened; such a current would in no case be sufficient to heat any part of the steel work seriously, and thus the fire risks are greatly reduced.

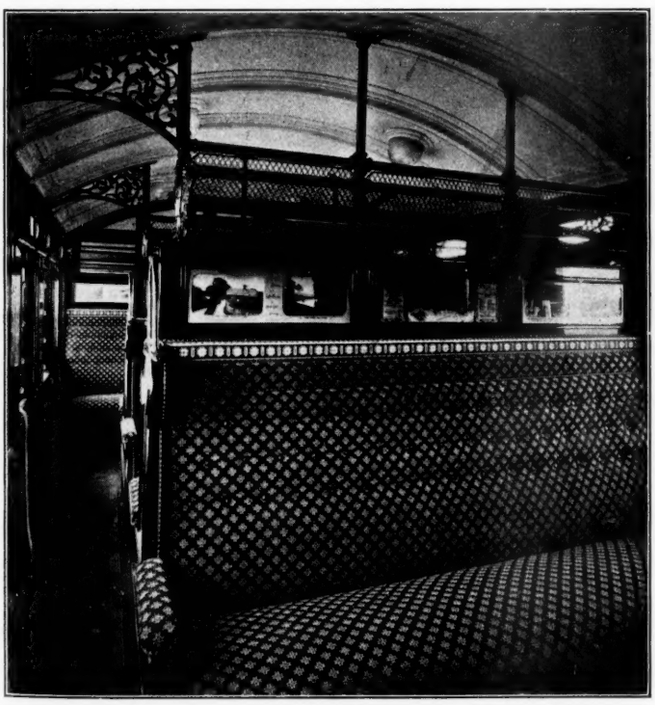
All the high-tension apparatus on the train, which is of the simplest nature, is enclosed in an entirely fireproof steel compartment, and access to it can only be obtained after the current is cut off and the whole apparatus connected to earth. This is obtained by a very simple but efficacious interlocking arrangement. All the circuits for lighting and control, and in fact every circuit to which it is possible to obtain access while current is on, in no case runs at a pressure of 300 volts.

Current is collected from the overhead wire which is supported at intervals of about every 10 ft. from two robust steel cables by a collector bow, which is kept pressed against the overhead copper contact wire by means of springs, which are brought into action pneumatically. The contact strips of these collector bows are composed of aluminum, fitted with grooves filled with heavy grease.

The rolling stock at present built consists of eight trains; each train is made up of three coaches, the first and last being a third-class carriage fitted at one end with the guard's van and motorman's compartment. The center coach is not equipped electrically and is entirely devoted to first-class passengers.

The two end coaches are motor coaches and each is fitted with four 120 h.p. single-phase motors, designed by Dr. Eichberg, the inventor of this type of compensated repulsion motor.

The motorman's compartment is situated in the extreme end



Method of Inside Communication; Third Class Coach.

of the guard's compartment, and is arranged in such a way that the driver is entirely separated from the guard while driving, and when not in use the compartment can be locked, leaving the hand brake to be operated by the guard.

There are several very special features, which are entirely novel, to be observed in connection with this rolling stock. Contrary to all the other electric railways which have adopted the American type of coaches with end doors, the Brighton Railway Company has adopted side door carriages, which, it is believed, will prove more satisfactory to the traveling public and all concerned. This design embodies most of the advantages of the compartment carriage without its disadvantages, and enables ample seating capacity and light to be provided, even if, occasionally in consequence of overcrowding, passengers may have to stand.

Each third-class coach has eight passenger compartments, in which a normal accommodation is provided for seating 66 passengers, but 72 people can be seated without discomfort. The first-class coach comprises nine compartments, and normally seats 56 passengers, but it will quite easily furnish seating accommodation for 74 passengers. The seating capacity per train is, therefore, 238 passengers. Ample parcel and umbrella racks are provided for the use of passengers, and all the trains are handsomely upholstered.

In order to facilitate the even distribution of passengers, a gangway has been provided, whereby, in case of one compartment being full, a passenger can easily find his way into the next; these passage-ways are by no means similar to the corridor coach, which would not be at all suitable for the purposes of local traffic, but they are so arranged that on one-half of the carriage they are situated on one side, and on the other half on the opposite side. A spring swing door opening both ways divides the smoking from the non-smoking compartment of each coach. There is no passage between the coaches.

A particular feature of the train is the lighting, provided by a double circuit of lights, each compartment being fitted with two Holophane globes, each containing two 10 c.p. lamps, or 40 c.p. to each compartment. By means of this arrangement an absolutely equal distribution of light is obtained with practically no shadows.

Each coach is fitted with two chemical fire extinguishers and with two oil lamps, so situated as to be easily accessible to the passengers or to the guard in case of emergency. Every precaution has been taken to prevent fire risks, the sides, roof and bottom of the coaches being entirely covered with sheet aluminum, and the bottom of the coach being furthermore covered with heavy asbestos sheeting, in addition to which, between the floor boards, a large space which is left has been filled in with slag-wool. Each coach is mounted on two pressed steel bogies with 42-in. wheels and 8 ft. wheel-base.

The overall length of the coach is 60 ft. and 41 ft. between bogie centers, the width overall being 9 ft. Besides ordinary hand brakes, Westinghouse air brakes of the last pattern are installed throughout the train.

The entire electrical and mechanical equipment has been carried out to the designs and under the direct supervision of Philip Dawson, M.Inst.C.E., the Electrical Adviser of the Brighton Railway Company, the repair shops, buildings, and switch cabin building having been designed by and carried out under the supervision of Charles L. Morgan, M.Inst.C.E., Chief Engineer.

The contractor for the whole work, with the exception of the coaches themselves, is the Algemeine Elektricitäts Gesellschaft of Berlin. It was, however, stipulated by the Brighton Railway Company that everything that was possible should be of British manufacture, with the result that with the exception of the electrical equipment of the trains, all the trains and the whole of the work has been carried out by British workmen and with British material.

The coaches and trucks were manufactured by the Metropolitan Amalgamated Carriage & Wagon Company of Saltley. The whole of the overhead line equipment and general electrical equipment of the line, including cables and switch gear, was carried out by Messrs, R. W. Blackwell & Co., who are sub-contractors for this section of the work, the cables being supplied by Messrs. Siemens Brothers and Messrs. Johnson & Phillips, the switch gear in the switch cabins having been manufactured by the British Thomson-Houston Company of Rugby.

The electric traveling cranes for the repair shops are being manufactured by Messrs. Stothert & Pitt, of Bath, while a special repair and maintenance wagon is being supplied by Messrs. Dick, Kerr & Co.

CAB SIGNALS AND CAB TELEPHONES ON THE TORONTO & YORK RADIAL RAILWAY.

The train despatching and block signal apparatus of the Simmen Automatic Railway Signal Company, which was briefly described in the *Railroad Age Gazette* of October 16, 1908, page 1169, has now been in use on the line of the Toronto & York Radial Railway for over six months, and is giving satisfactory service. The line where the signals are

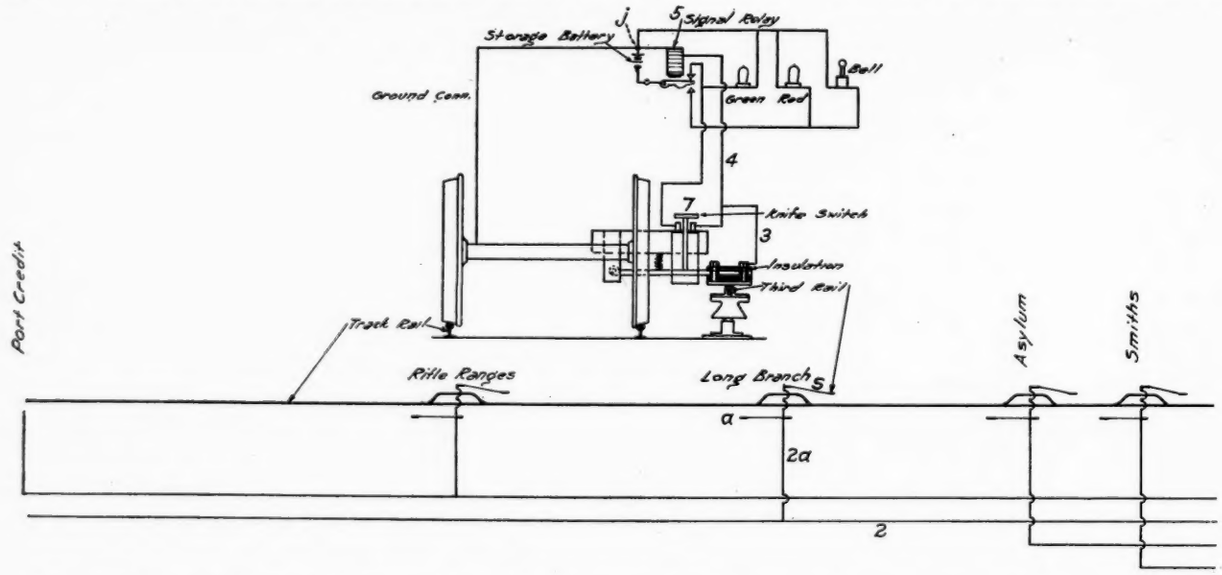


Fig. 2—Line Wires and Wiring on Car; Simmen Block Signal System.—Continued on Next Page.

in use is an electric road running westward from Toronto to Port Credit, 10 miles. In the summer the heavy excursion traffic furnishes a considerable part of the business, and on Saturdays, Sundays and holidays this summer the cars have been run at intervals of 15 minutes each way. On May 24, Queen Victoria's birthday, the number of signal indications given was 4,752.

In the system as used on this line two principal functions are performed. The train despatcher gives to the motorman proceed and stop signals by means of electric lights in his cab—a new signal at the entrance of each block section—and the cars automatically record their passage over a short third rail at each station by means of an electro-magnet which makes perforation in a sheet of paper, which is kept moving over a table by clockwork. This moving sheet is on a table before the despatcher, so that he has constantly a graphic record of the situation of all cars. Each record appears not only when the car enters a block section, but by means of apparatus set in operation by the electro-magnets is kept up continuously while the car is in that section, and until it begins to report itself in another section.

There is a separate wire from the despatcher's office to each station, and it is by the circuit closers for these wires, ranged in order on the table in front of him, that the despatcher gives the light and bell signals in the cars. The clock not only keeps the record sheet moving, but by a circuit breaker regulates the intervals of time between the perforations. At each station there is a "third rail" conductor about 30 ft. long fixed at the side of the track, one for the siding and one for the main track, and there are also distant rails about 1,000 ft. each way from the siding. In the motorman's cab is a battery, a green and a red electric light and a relay, the armature of which constitutes the switch by which the current is turned into the green or the red light, according to whether the signal is clear or stop. In parallel with the red light is a bell. Besides the light signal, the motorman also has a telephone by which at any time when the car is on a third rail he can communicate with the despatcher.

We publish herewith a drawing, Fig. 1, illustrating a sample over the ten-mile Port Credit line for a period of two hours, of the automatic record sheet, showing all of the movements and a diagram, Fig. 2, showing the wire connections from the despatcher's office to the several stations. This diagram does not show all of the apparatus in the despatcher's office, and the proprietors are not ready to publish all of the details of their scheme; but it has seemed desirable to show this partial exhibit as an indication of the direction in which they are experimenting. For the present they have an automatic record of the movement of trains and a system of manual block signaling. The block signaling is conducted by means of

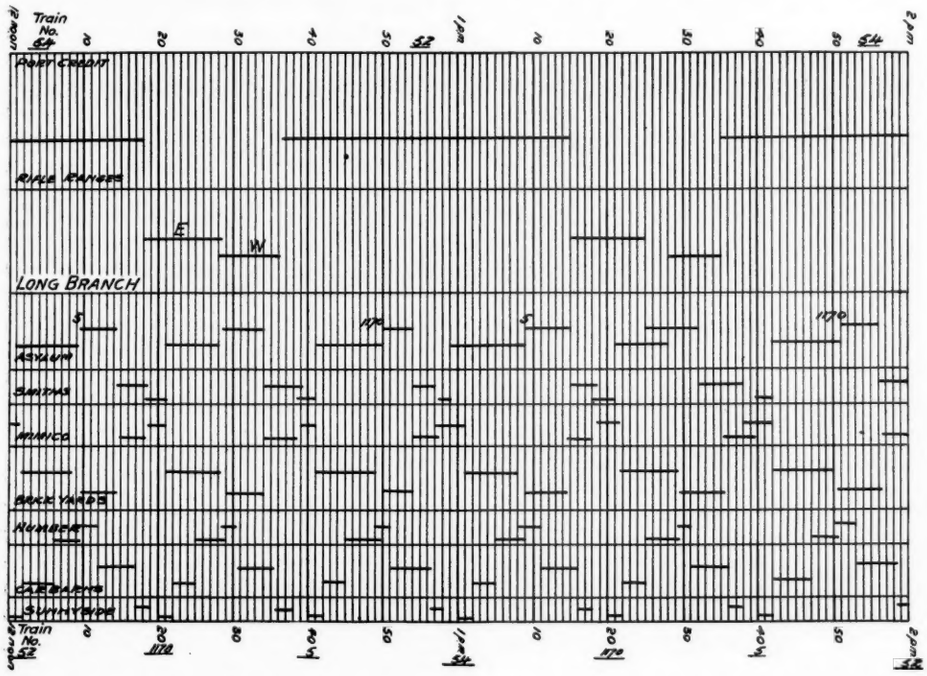


Fig. 1—Automatic Record of Trains on the Toronto & York Radial Railway.

The lines of marks for westbound trains run from lower left toward upper right; for eastbound, from upper left to lower right.

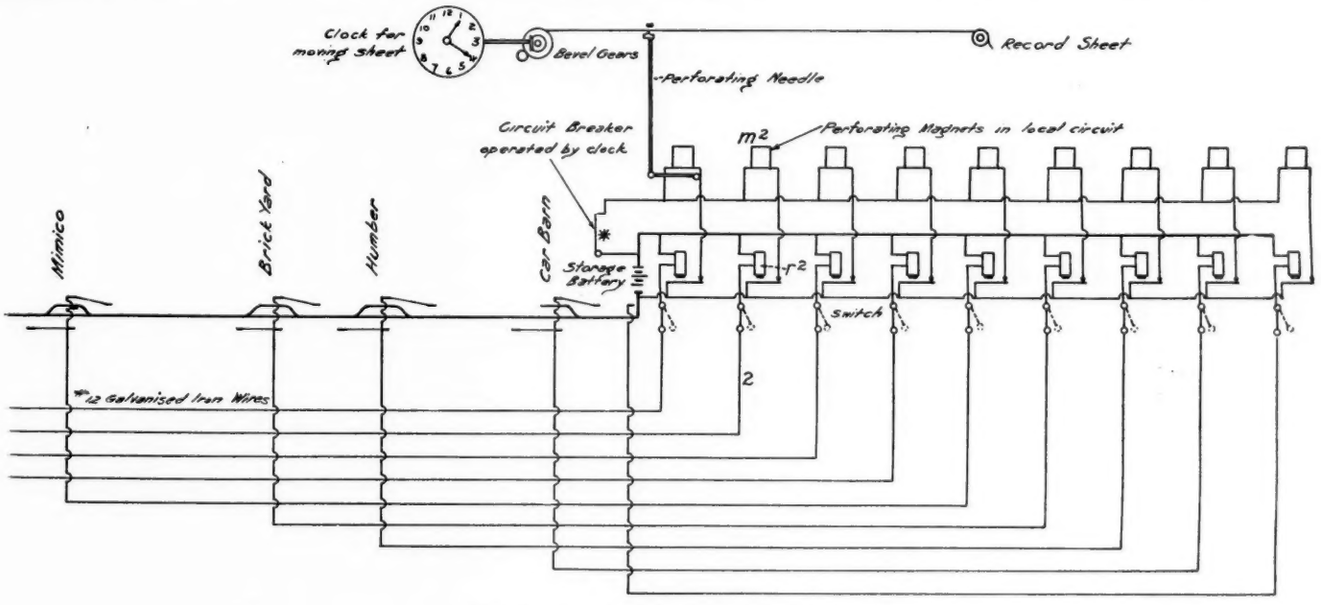


Fig. 2—Continued from Preceding Page.

telephones and is controlled wholly by one man—the despatcher—for all of the stations on the line. Each station is a meeting point and each meeting point is a station. A motorman does not leave a station until he gets a telephonic clearance from the despatcher; and in normal operation the green light signal confirms the despatcher's message.

Fig. 2 shows the arrangement of line wires with a part of the apparatus and connections in the despatcher's office, and the apparatus on a car. The railway extends from Toronto (car barn) westward to Port Credit, 10 miles, and the despatcher's office is at the east end. In the diagram the car is supposed to be at Long Branch. When this car reached Long Branch and made contact with the third rail, either *a* (while on the main track) or *s* (while on the siding) it closed a circuit from the battery at the despatcher's office through relay r 2, line wire 2, wires 3, 4, on the car, signal relay, axles and wheels to the track, and by the track back to the battery.

With the completion of this circuit through relay 2, perforating magnet m2 begins to record the presence of the car by puncturing the moving record sheet at intervals of two seconds; and the speed of the movement of the sheet over the table is such that these punctures make what is substantially

Fig. 3—Train Despatcher's Office, Toronto & York Radial Railway, Port Credit Line.

a continuous line; not so solid and distinct as would appear from our illustration, but for all practical purposes a line. This perforating continues until the car reaches the next station. For example, referring to Fig. 2, train No. 52, leaving Sunnyside at 12 noon; Car Barns, 12.02; Humber, 12.06; Brick Yards, 12.09½; Mimico, 12.14½; Smith's, 12.18¼; Asylum, 12.21; reached Long Branch at 12.28; and the record, indicated in the drawing by *W*, continued until the car reached Rifle Ranges at 12.36.

Train 54, eastbound, reached Long Branch at 12.28½, as shown at E; and both trains are on the record there for half a minute; but only one of them receives a proceed indication in the cab at the same time; for the circuit closers in the despatcher's office, by which the clear signals are given, are worked by levers which are suitably interlocked, so that before giving a train a clear signal to enter a block section, the signal previously given to another car for that section must be annulled. When a train enters a new block section the perforation for the preceding section is automatically stopped.

The despatcher controls the green cab signals which indicate clear at the entrance of each block by sending current from his battery to energize the relay (5), which in turn lights the green or "proceed" light; and whenever, during the presence of a car on a third rail, this current is not present in the line, the relay is de-energized and the red light current is closed through its back contact. When two cars are at a meeting point, both in contact with third rails, no provision is made to clear the signals separately; they both get their clear signal simultaneously from the same source of energy over the same circuit, except that the current branches through the two cab circuits in multiple. Where two or more cars meet before the despatcher clears any of the signals, he gets the report from all cars that are to meet at that point by telephone. The east and westbound perforating magnets are differentiated by means of local circuits in the despatcher's office. When an eastbound movement is made the despatcher's switches are set for an eastbound movement, and this eastbound position of the despatcher's switch connects the eastbound perforating magnet. When a westbound car movement is made the despatcher's switch is in a westbound position, in which position the westbound perforating magnet is connected.

When the shoe of a car passes off the third rail the knife switch (7) is closed before the despatcher's battery is cut off, and the battery on the car not only lights the green light but energizes the local cab circuit through the front contact of the armature of the relay and the knife switch, thus keeping the relay continually energized until a new signal indication is obtained at the next third rail.

The main line circuit is only energized momentarily when the car is passing the third rail, but the continuous perforation, as long as the car is in the block, is maintained by having this momentary impulse act on polarized relays, one for each block, which retains the impulse; and when the car passes to the next block the polarized relay is acted upon by an opposite current, thus cutting out the previous perforating magnet. On steam roads which have track circuits Mr. Simmen proposes to run his line wire leading from the despatcher's office through the armature of the track relay, so that if the despatcher should wrongfully close the circuit for a clear signal the energizing current could not reach the cab relay.

In the month of June the number of cab-signal indications given on the Port Credit line was 82,564, and the number of failures was four.

TRYING MOTOR CARS IN THE WEST.

Several railways running out of Chicago have been testing passenger motor cars. The Rock Island, as previously stated in this paper, has been using an oil burner which was built for it by the American Locomotive Company. More recently this road has been trying a Strang and a McKeen car. On August 3 it received from the General Electric Company a "gas-electric" car, and some officers of the road with invited guests made a trial trip from the La Salle street station to Bureau, Ill., and back. This party included President Winchell, Vice-President Biddle, General Manager Melcher, General Passenger Agent Allen and General Superintendent of Motive Power Nettleton, of the Rock Island; F. H. Clark, general superintendent of motive power of the Burlington; George A. Hancock, general superintendent of motive power of the St. Louis & San Francisco, and others. The trip was very successful.

The Atchison, Topeka & Santa Fe also has one of the General Electric gas-electric cars, and a party of its officers made a trip in it one day last week. This car is to be put in service on the Southern Kansas division. The Santa Fe has also been trying a steam motor car built by T. H. Curtis, superintendent of machinery of the Louisville & Nashville, and a McKeen car.

The Rock Island expects soon to have six motor cars of different designs in service on its lines.

A contract has been made between the Central Railway of Guatemala and the government for building a short line connecting the Guatemalan and the Mexican railway systems.

General News Section.

James J. Hill has given $2,500 to be awarded as prizes for small grains and grasses at the National Corn Exposition in Omaha next December, and has also promised to make a speech at the exposition.

At the Alaska-Yukon-Pacific Exposition, at Seattle, on Tuesday of this week, a bronze bust of James J. Hill was unveiled. The bust is the gift of the state of Minnesota, a tribute to her most distinguished citizen.

At the shops of the Pennsylvania Lines west of Pittsburgh five engines a day are now being fitted with ash pan fixtures designed to comply with the federal law regulating ash pans which goes into effect next January.

The Bessemer & Lake Erie broke all previous records handling ore in July, the tonnage being 971,320 gross tons, or 24,000 tons more than in June, the next largest month. It is expected that the million mark will be reached in August.

The Interborough Rapid Transit Company, operating the subway and elevated lines in Manhattan, New York City, is building six rest houses for its employees. Each building will be 65 ft. by 36 ft. and will contain restaurant, reading room, smoking room, kitchen and baths. August Belmont, Chairman of the Board of Directors of the company, has given $10,000 to be used to provide books and papers for the reading rooms.

The Schmidt Traction franchise, giving an associate of Mayor Johnson, of Cleveland, a grant in Payne avenue, to operate an electric railway with three-cent fares, has been defeated at a general city referendum vote by a majority of 3,982. This three-cent fare line was to be the first of a number which Mayor Johnson had planned and the defeat of his franchise apparently marks the voters' disapproval of the mayor's idea.

Announcement was made on July 27 of the indefinite postponement of the entry of the St. Louis & San Francisco into New Orleans. The Frisco's entry to New Orleans was to be over the tracks of the Louisiana Railway & Navigation Co. The reason assigned by President A. J. Davidson, of the Frisco, for the postponement was that "the physical condition of the road (Louisiana railway) did not warrant the opening of through traffic." The opening had been widely advertised and plans had been made for numerous low rate excursions over the new route.

J. E. Hurley, General Manager of the Atchison, Topeka & Santa Fe, is quoted in an interview as saying that there is no immediate likelihood of a shortage of grain cars on the Atchison. There are 1,200 idle cars at the shipping stations in Kansas and Oklahoma, all in good repair and available for service. Reports of the Rock Island showed that on July 27 100 cars of wheat were moved on its lines in Kansas, that 112 cars were ordered and that 345 cars were available to fill these orders. The movement of wheat from Kansas is heavier than usual at this time of year, and the crop is large.

The McKeen Motor Car Co., Omaha, Neb., has shipped one of its motor cars to the Erie Railroad. The car was taken east under its own power, runing from Chicago to Buffalo over the Lake Shore & Michigan Southern at the request of this road in order that a party of officers could be on board to watch its operation. The car is 70 ft. long, seats 75 people in the passenger and smoking compartments and has a 15-ft. baggage compartment. The engine is the McKeen standard 200-h.p. machine, fitted in this case with intermediate gearing so that speeds of about 60 miles an hour can be attained.

The Hudson & Manhattan is now running trains regularly through its tunnel from Cortlandt street, New York, to the Pennsylvania, the Erie and the Lackawanna stations on the other side of the Hudson River. In the morning and evening rush hour trains are run each way every three minutes and during the rest of the day at intervals of five minutes. Through trains from the Pennsylvania station in Jersey City through the Sixth avenue tunnel to 23d street will not be put on for a week or more, as the cars ordered by the company have not all arrived. In the meantime passengers making this trip are transferred at Hoboken.

Governor Hadley, of Missouri, on July 28 wrote a letter to Dr. A. H. Hammel, president of the Missouri Board of Health, complaining about the sanitary condition of the railway cars used in Missouri. He said that recently during his travels about the state he had noticed that the condition of both ordinary coaches and sleeping cars, and particularly of the closets and washrooms, is bad and that promiscuous expectoration is general. He suggested that Dr. Hammel appoint a committee from the Board of Health to investigate these conditions, and to take up with the railways the question of observing rules that the board may establish for their improvement. "Without reference to your legal authority in the matter," said the governor, "I am satisfied that the officers of the railways will be glad to co-operate with you by observing such practical sanitary regulations as your board may adopt."

Sale of 'Frisco Bonds in France.

"The conclusion of the negotiations whereby the group of French bankers have bought outright the $10,000,000 St. Louis & San Francisco general 5 per cent. bonds, which they offered for public subscription recently, has very much more significance than is really apparent on the face of the transaction," said a representative of the bankers through whom the negotiations were conducted. "As a matter of fact, a mere $10,000,000 means comparatively little to the French investing public, especially at this time; there is little doubt but that three or four times that amount could be readily absorbed.

"The real significance of the sale of these bonds lies, first, in the fact that it means much to the 'Frisco itself—that it is an evidence of the faith which the French bankers have in the future of the property. Then, too, the successful distribution of the bonds in France will have the beneficial effect of creating still more favorable sentiment towards American securities in general. In due course the necessary steps will be taken to list the 'Frisco bonds on the Paris Bourse and the bankers are confident that this can be accomplished as soon as the present tariff agitation is over. The listing of the bonds is, however, a comparatively unimportant consideration.

"It may be said that the French purchase of the 'Frisco bonds is indirectly the outcome of a visit paid to this country a year or more ago by a number of prominent financiers, who spent considerable time in examining with great care several of the large railway properties, with which they are now as familiar as the average investor in this country. These bankers have gone into the matter very thoroughly, for the reason that their clientele is almost wholly dependent upon them for the proper selection of its investments.

"The 'Frisco transaction is the third large one of its kind where provision has been made for the issuance of the bonds of American railways in France and payable principal and interest in French currency, the other two transactions being those of the New York, New Haven & Hartford, which placed part of an issue of $29,000,000 in France in 1907, and the Pennsylvania, which placed $40,000,000 in 1908. The 'Frisco sale differs slightly from either of the other two, however, in that the abonnement charge, which in the case of bonds amounts to approximately one-half of one per cent. per annum, will be collected for the Government by the bankers at the time of the payment of the coupons of the bonds, whereas in connection with the New Haven and Pennsylvania issues the abonnement charge was paid to the Government by the railway companies at the time the issues were made. Taking into consideration this abonnement charge, it will be seen that the French investor will be getting what is practically a 4½ per cent. bond, which, in view of the fact that it is selling at a discount, should be particularly attractive to them, especially

as they have the assurance of their bankers as to its future.

"Financing of this kind has another important feature, namely, the relief which it gives to the domestic market for the same bonds. Securities issued as this $10,000,000 of 'Frisco bonds will be, will never return to this market; they will stay where they are placed during the entire life of the bonds."

In general the financial community is inclined to look upon the placing of the bonds abroad as additional evidence of the steadily improving financial status of the 'Frisco system. It is understood that the June earnings, which will be made public shortly, will show very satisfactory increases over the earnings of the previous months.—*Wall Street Journal.*

Disastrous Collision on the Spokane & Inland.

In a butting collision of electric trains on the Spokane & Inland Railway last Saturday afternoon at La Crosse, Wash., 13 persons were killed and 60 injured. The trains appear to have met on a curve. Each train is said to have been moving at about 15 miles an hour. The westbound was a special, said to have been ordered to meet the eastbound at La Crosse, and to have run beyond the switch at which the meeting should have taken place, because of failure of brakes or of the man managing them. The motorman of the eastbound train is reported as killed and the one on the westbound as injured. Both trains were overloaded, all trains having been crowded since the opening of the land-drawing. Extras have been running constantly. La Crosse is between Spokane, Wash., and Coeur d'Alene, Idaho.

Damage to Wabash by High Water.

The Wabash probably suffered more by the recent floods in Missouri than any other railway. President Delano and other officers spent last week in Missouri supervising the work of getting the lines open again. All lines in Missouri are now open, but soft track still compels low speeds. From Brunswick to Darlington the track was completely washed out every few miles, the washouts being all the way from a few feet to 1,000 feet long. This was the work of the Grand river, which rose 7½ ft. in 45 minutes, and at some points covered the tracks to a depth of 15 ft. The Missouri river overflowed and washed out a great deal of track from Brunswick east to Keytesville; and from Brunswick west to De Witt, about 7 miles, the track was almost completely gone. There were also many bad places between Harlem and Randolph. The protection work which was done by the Wabash along the Missouri river last year prevented much greater damage, and it is probable that a good deal more of this kind of work will be done as soon as practicable.

The washout near Excelsior Springs Junction, where a train sank into the water and six people lost their lives, all but one of whom were employees, was of an extraordinary nature. The track at this point is about 150 ft. from the Missouri river. Because it was so far from the river it was not thought necessary to do any protection work here, and the engineers are still unable to understand how the washout took place. It is suspected that the ground lies on quicksand and that the river had worked its way back under the soil to the point where the accident took place. The total damage to the Wabash in Missouri by the recent high water is estimated at $300,000.

Motor Cars on the St. Joseph & Grand Island.

The St. Joseph & Grand Island is running gasolene motor cars in local and suburban business. For suburban service between Highland, Kan., and St. Joseph, Mo., a McKeen motor car 55 ft. long and seating 58 passengers is in use. Highland is a university town 29 miles from St. Joseph. The crew of the motor car consists of the motorman and the conductor. The car has averaged 75 passengers on each trip. Not all of the business it has got is new business, but much of it is. The car is used quite generally by shoppers. Besides stopping at regular stations there are four platforms between stations.

The Grand Island has ordered from the McKeen Motor Car Co., Omaha, Neb., three more motor cars each 70 ft. long and seating 90 passengers. One of these cars will be put in service between Seneca, Kan., and St. Joseph, and another between Fairbury, Neb., and Grand Island, Neb. The third will be used between St. Joseph and Kansas City. All of this service will be in addition to that furnished by the present regular passenger trains.

The Wright Aeroplane Accepted by the Government.

At Fort Meyer, Va., on the evening of July 30, Orville Wright, carrying as a passenger Lieutenant B. D. Foulois, traversed with his aeroplane a course of about five miles, Fort Myer to Alexandria and back (a round trip of over 10 miles), in 14 minutes, 42 seconds; and this performance, in connection with the endurance flight, accomplished the week before, completes the tests required to meet the conditions imposed by the War Department. In his flight Wright at one point was about 500 ft. above the valley of a stream. The average altitude throughout the course was about 200 ft. The Wright brothers now receive from the government $30,000, the increase of 20 per cent. above $25,000 being a bonus based on the increase in the average speed above 40 miles an hour. On the return part of this trip Wright traveled 47.431 miles an hour. His speed to Alexandria from Fort Myer was 37.735 miles an hour, making the average 42.583.

The Buenos Ayres Exposition.

The Argentine Minister at Washington announces that applications for space at the Railway Exposition to be held next year in Buenos Ayres, in commemoration of the centenary of independence of the republic, will be received until September 1.

Pennsylvania Tunnel to Long Island City Completed.

The northernmost of the four tunnels being built under the East River by the Pennsylvania Railroad between Manhattan and Long Island City, New York, is now open from Manhattan through to the Sunnyside yard east of Long Island City, and Mr. Eustis, one of the state public service commissioners, who has inspected the tunnel, says that the railway officers expect to be running trains through this tunnel from Manhattan to Long Island points by the first of next January —which is several months before the time which has been set for the probable opening of the line under the North River.

Government Positions.

The list of United States civil service examinations to be held in the fall of 1909 includes: Aid, coast and geodetic survey; civil engineer, departmental service; civil engineer and draftsman; civil engineer and superintendent of construction; clerk, Isthmian canal service; draftsmen; engineer, Indian service; local and assistant inspector of boilers; superintendent of construction; surveyor, Philippine service.

Roadmasters' and Maintenance of Way Association.

The twenty-seventh annual convention of the Roadmasters' & Maintenance of Way Association will be held at the Ebbitt house, corner of F and Fourteenth streets, Washington, D. C., September 14 to 17, 1909. The following will be discussed:

1. Relaying Rail, Organization of Forces, Methods of Work and Costs.
2. Standard Switch Target and Safety Switch Devices.
3. Comparative Value of Chats, Burnt Gumbo, Gravel and Stone Ballast under Heavy Traffic.
4. Cattle Guards.
5. Rail Fastenings, including Insulated Joints.
6. Tie Plates and their Virtues.
7. New and Improved Appliances and Devices, including Ties.
8. Paper on Treated Ties, by Mr. J. M. Meads.

Topical questions for discussion: (*a*) Paving of Ditches. (*b*) Dressing of Gravel Ballasted Track. (*c*) Length and Size of Ties. (*d*) How to Drain the Midway of Track, whether

by Surface Ditches or by Tile Drains. (*e*) Should the Gage of Curves be readjusted for wear to the side of the railhead, and by moving which rail. (*f*) Quality of Track Labor.

General Passenger Agents.

The annual meeting of the American Association of General Passenger and Ticket Agents is to be held in Toledo, Ohio, September 14 and 15.

National Association of Railway Commissioners.

The annual meeting of this association to be held in Washington, D. C., is to be begun November 16 instead of October 12. The date has been changed because in October nearly or quite all of the members of the Interstate Commerce Commission will be absent from Washington.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa
AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'NS.—G. W. Dennison, Penna. Co., Toledo, Ohio
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York; second Friday in month: New York.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.: Oct. 19, 1909; Jacksonville, Fla.
AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—R. E. Wilson, Ry. Exchange, Chicago
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N.Y.; 2d Tues. in month; annual, Dec. 7-10; New York.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York; Oct. 18-22; Denver, Colo.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago
ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, New York.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod. Montreal, Que.; irregular, usually weekly; Montreal.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Libery St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.
INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—E. C. Cook, Royal Insurance Bldg., Chicago.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month: except July and August; Des Moines.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month; except June, July and August; Pittsburgh.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.: Nov., 1909; Washington.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago; Sept. 7-8; Fort William Henry, Lake George, N. Y.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.; September, 1909; Denver.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St.; Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

Many of the western railways have given notice that they will make excursion rates on the basis of a fare and a half for the round trip from points on their lines to Toledo, Ohio, for the Mardi Gras celebration, which will be held August 22 to 27.

The Baltimore & Ohio, the Pennsylvania and the Delaware, Lackawanna & Western have filed with the Interstate Commission import freight tariffs, effective September 1, from New York and Baltimore to Chicago and other middle western points making reductions below the rates now in force.

The Central Passenger Association has made reduced rates on the certificate plan as follows: Grand Fountain United Order of True Reformers, Cincinnati, Ohio, August 24, one and a half fare; German-American Alliance of Ohio, Schiller Memorial Association, and Lake Erie Saengerfest, Cleveland, Ohio, August 21 to 23, one and a half fare; National Encampment of the Union Veteran Legion, Washington, D. C., September 8 to 11, one and three-fifths fare.

A. M. Ingersoll, vice-president of the Chicago, Milwaukee & Puget Sound, has announced that this road will absorb all switching charges at both Seattle and Tacoma on grain coming to these terminals to be delivered to docks, mills, etc., within the switching district, from any point in the interior whence the rate is 15 cents per 100 lbs. or more. This territory commences with Smyrna, 13 miles east of the Columbia river, and includes all stations east thereof.

Beginning August 15 the Boston & Albany is to run a fast train to and from Boston, connecting at Albany with the Twentieth Century Limited Express of the New York Central. The time between Boston and Albany is to be about 5 hours 15 minutes. This will make the time between Boston and Chicago 20 hours and 30 minutes. The run of the 200 miles from Albany to Boston was made in five hours on a number of occasions during the brief speed war of 1877.

The western roads will appeal to the courts from the decisions of the Interstate Commerce Commission reducing freight rates from Atlantic seaboard points to Des Moines, Iowa. In this case, as in the Missouri river jobbers' case and the so-called Kindel case, brought by George J. Kindel, of Denver, the Commission applied the principle that a through rate should be less than the sum of the local rates over the same line. The appeal in the Des Moines case will be on the same grounds as in the Missouri river jobbers' and the Kindel cases.

The Railroad Commission of Illinois has adopted resolutions requiring the express companies doing business in the state to file schedules of rates. The commission has received many complaints from shippers regarding the "excessive and exorbitant charges made by the express companies," and the attorney-general of the state has rendered an opinion holding that the commission has power to fix reasonable maximum express rates. Strong efforts were made at the last session of the legislature to get a bill passed giving the commission jurisdiction over express companies, but these efforts failed.

Joseph Richardson, chairman of the committee on standard ticket contracts of the American Association of General Passenger & Ticket Agents, has issued a circular letter requesting the officers of the various railways to send to A. D. Joslin, auditor of passenger receipts of the Illinois Central, samples of all forms of interline tickets in use and also samples of forms of interline tickets which they regard as improvements on forms now in use. The purpose is to have the numerous forms of interline tickets carefully examined with a view to adopting satisfactory standard forms.

A conference was held in Chicago on August 2 by the Uniform Classification Committee of the railways and the committee on uniform classification of the National Association of Railway Commissioners. Commissioner E. E. Clark, of the Interstate Commerce Commission is chairman of the latter committee, which was appointed at the last annual convention of the National Association of Railway Commissioners, with instructions to formulate a plan for the unification of freight

classifications. Chairman Collyer, of the Uniform Classification Committee, and his associates, explained to the railway commissioners the work that they are engaged in.

The Erie & Western Transportation Company has started on its first trip the new 5,000-ton package freight steamer Conemaugh, which has just been built at Detroit. The company will soon order another combined freight and passenger steamer with a capacity of 300 passengers and 3,000 tons of freight. The Conemaugh is one of the largest steamers on the lakes and is a sister ship of the Wissahickon. She is 372 ft. long, with a hold 30 ft. deep, having a capacity of 5,000 tons. The new steamer will be engaged entirely in the transportation of merchandise eastbound and westbound, the eastbound lading consisting mainly of flour and mill products. Her general time between Erie and western lake ports will be from four to five days.

The New York State Public Service Commission, by vote of two to one, has declined to order the Interborough Rapid Transit Company to set apart cars in its trains for the exclusive use of women. The application or complaint of the Women's Municipal League has been dismissed. In the opinion of the majority (Commissioners Bassett and McCarroll) the women would still be compelled to stand when trains are crowded; and it is believed, further, that there is not a preponderant demand among the women of the city for special cars. It will be recalled that the Hudson & Manhattan tunnel line ran a special car at the rear end of its trains, in the rush hours, for about three months, and then abandoned the practice. The women did not care enough about the separate car to go to the end of the train to get the benefit of it.

According to the *Journal of Commerce*, wholesale dealers in eggs of New York City have unsettled claims against the railways for damages amounting to $150,000. The informant of the *Journal of Commerce* says that the railways will not deliver shipments of eggs to a consignee unless he is willing to receipt for the goods in good order; hence if the eggs have been damaged or appear to have been damaged they are left on the carrier's hands, and he sells them for the best price he can get. Being treated as perishable goods, the eggs are sold through commission merchants who it is claimed get 5 per cent. for their services. The New York merchants complain loudly, also, because the railways insist on settling for lost or damaged goods on the basis of their value at the point of shipment.

Conditions of the Cotton Crop.

The crop reporting board of the United States department of agriculture estimates that the average condition of the cotton crop on July 25, 1909, was 71.9 per cent. of a normal, as compared with 74.6 on June 25, 1909; 83.0 on July 25, 1908; 75.0 on July 25, 1907; 82.9 on July 25, 1906, and 80.6 the average of the past 10 years on July 25. Comparisons of conditions by states follow:

States.	July 25, 1909.	June 25, 1909.	July 25 1908.	July 25 10-yr. av.
Virginia	71	76	90	82
North Carolina	71	75	89	81
South Carolina	77	77	84	80
Georgia	78	79	85	81
Florida	84	88	85	84
Alabama	68	64	85	80
Mississippi	64	61	86	80
Louisiana	58	62	83	81
Texas	70	79	82	81
Arkansas	76	76	86	81
Tennessee	80	80	88	83
Missouri	85	83	88	84
Oklahoma	79	84	66	82
United States	71.9	74.6	83.0	80.6

INTERSTATE COMMERCE COMMISSION.

Rates on Smithing Coal.

Sligo Iron Store Co. v. Atchison, Topeka & Santa Fe. Opinion by Commissioner Harlan.

To avoid the payment of the published through rate on "smithing coal" the complainant falsely billed a carload shipment as "bituminous soft-coal slack" and thus sought to secure the benefit of a lower combination of local rates on soft coal based on an out-of-line point; and in this plan the defendant's agents at Chicago joined. As neither party comes before the commission with clean hands no relief order will be entered.

Compared to the soft coal mined in the west, smithing coal is a different commodity with different characteristics and of a different value. Whether it may move under a special smithing coal rate is not here determined; but there are no grounds shown for disturbing the rates on smithing coal from Chicago to Portales, N. Mex.

Track Storage Charges on Oats.

F. M. Turnbull Co. v. Erie. Opinion by Commissioner Clements.

Complainant ships grain from points in the west directly to the defendant's yards at Twenty-eighth street, New York, and in this proceeding contends that the track-storage charges of the defendant applicable to hay, established by the commission in the case of New York Hay Exchange Asso. v. Pennsylvania, 14 I. C. C. Rep., 178, are unjust when applied to the shipment of oats. Order issued in the case referred to the defendant lowered its track-storage charges on both hay and oats are as follows: For first 48 hours after car is placed on team track for delivery (time to be computed from first 7 a.m. after car is placed) no charge will be made. For the next succeeding two days the charge will be $1 per car per day or fraction thereof. For each succeeding day the charge will be $2 per car per day or fraction thereof. These charges are found to be reasonable on oats as well as on hay.

STATE COMMISSIONS.

Orville F. Berry, state senator from Hancock county, Illinois, has been appointed a member of the Illinois Railroad Commission, succeeding W. H. Boys, resigned.

E. G. Connette, general manager of the Worcester (Mass.) Consolidated Street Railway, has been appointed transportation engineer of the New York Public Service Commission, first district, with office at New York. The salary is to be $8,000.

The Railroad Commission of Texas proposes to order that in the application of all freight rates the Gulf, Colorado & Santa Fe, the Gulf & Interstate and the Texas & Gulf shall be considered as under one management and control, also to cancel all rates in force on the Texas & Gulf which are higher than rates on the same articles between the same points on the Gulf, Colorado & Santa Fe.

The Railroad Commission of Nebraska has issued an order fixing dates on which the railways in that state are required to appear and show cause why schedules of mileage freight rates proposed by the commission shall not be adopted. The commission holds the present rates excessive and unreasonable. The following are the dates on which the different roads are required to appear: Missouri Pacific, August 24; Rock Island, September 14; Chicago & North Western, September 21; Union Pacific and St. Joseph & Grand Island, September 28; Chicago, Burlington & Quincy, October 5.

The Railroad Commission of Kansas has committed itself to the policy of forcing railways to cease to base rates from the East to Kansas points on the Missouri river and to begin to base them on Galveston. The Southwestern Shippers' Traffic Association is also committed to this policy, the aim of which is to secure more favorable rates to Kansas, Oklahoma, Colorado and Texas from New York and New England. John Dawson, attorney for the Kansas commission, has issued a statement in which he says that there are two methods of procedure that may be followed. One is to bring suit in the name of the Southwestern Shippers' Traffic Association to readjust the whole schedule of rates to the Southwest, and the Kansas commission has been invited to intervene in such a suit. The other plan is to attack what are regarded as the most unjust schedules one after the other.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1909.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Arizona & New Mexico	108	$79,470	$7,205	$89,263	$5,731	$4,030	$56	$13,273	$1,597	$24,687	$64,576	.....	$387	$64,189	$16,648
Baltimore & Ohio	3,992	4,699,597	1,151,866	6,212,080	906,272	1,059,050	142,790	1,976,329	129,524	4,213,965	1,998,115	$39,927*	180,810	1,777,378	452,654
Bessemer & Lake Erie	201	757,752	24,987	789,677	60,129	121,044	8,134	168,873	6,786	364,966	424,711	.....	6,000	418,711	181,251
Carolina, Clinchfield & Ohio	211	40,137	9,479	53,562	10,585	12,131	2,154	12,530	6,040	43,440	10,122	.....	1,200	8,922	8,143
Chicago & Northwestern	7,635	3,740,076	1,490,388	5,671,536	1,069,301	744,066	99,477	1,989,980	100,850	4,003,674	1,667,862	15,235*	229,632	1,422,996	‡280,335
Chicago, Cincinnati & Louisville	284	84,309	31,098	121,035	32,052	22,290	9,970	48,453	6,259	119,024	2,011	.....	3,405	1,394†	32,600
Chicago, St. Paul, Minn. & Omaha	1,739	744,999	334,519	1,143,738	214,294	177,278	25,629	379,191	25,701	822,093	321,645	374*	58,310	262,961	‡20,141
Cleveland, Lorain & Wheeling	195	371,596	18,626	408,150	40,853	78,550	6,500	110,316	6,493	242,712	165,438	.....	11,678	153,760	‡28,316
Cleveland Terminal & Valley	93	73,813	14,490	93,964	8,186	10,911	1,600	36,078	1,639	58,414	35,550	.....	2,455	33,095	13,057
Coal & Coke	191	43,393	11,403	56,899	10,243	15,631	1,003	15,011	1,971	43,859	13,040	5,421	3,500	14,961	7,995
Colorado & Southern	1,250	498,520	126,925	659,836	111,627	124,557	14,138	216,018	20,932	487,272	172,564	2,071*	21,025	149,468	‡19,410
Cumberland Valley	162	152,078	47,536	209,795	34,925	16,895	3,804	61,520	7,953	125,097	84,698	233	8,161	76,770	‡8,541
Detroit & Mackinac	348	68,228	23,317	97,205	17,842	16,847	2,094	28,207	3,078	68,068	29,137	2,863*	6,850	19,424	‡11,051
El Paso & Southwestern Co.	867	507,861	88,550	628,412	103,136	64,239	10,952	161,671	23,825	363,823	264,589	303*	17,530	246,756	76,576
Florida East Coast	584	185,239	65,740	302,748	27,398	34,694	3,455	84,149	17,124	166,820	135,928	.....	13,433	122,495	118,493
Fort Worth & Denver City	454	209,003	128,376	355,837	45,893	49,134	7,585	117,501	14,070	234,183	121,654	569	9,206	113,017	9,816
Kansas City Southern	827	562,842	109,401	752,741	84,616	88,730	26,083	227,799	29,305	456,533	296,208	.....	25,344	270,864	99,004
Lackawanna & Wyoming Valley	23	5,093	40,734	46,870	3,166	7,561	790	16,063	1,283	28,863	18,007	213*	.....	17,794	‡3,544
Maine Central	931	441,568	261,790	755,308	98,350	101,026	8,678	258,052	23,082	489,188	266,120	2,125	31,962	236,283	80,428
Maryland & Pennsylvania	80	14,304	10,401	29,805	4,193	3,277	682	11,480	1,823	21,455	8,350	800	1,022	8,128	‡234
Mississippi River & Bonne Terre	53	45,551	8,076	59,689	8,442	9,605	993	19,310	3,634	41,984	17,705	.....	923	16,782	‡7,458
Missouri & North Arkansas	346	27,392	15,815	46,777	13,583	7,195	1,310	17,480	1,934	41,502	5,275	.....	1,758	3,517	9,755
Monongahela	61	88,218	2,021	91,780	13,643	4,737	441	18,672	2,063	39,556	52,224	.....	1,200	51,024	23,013
Monongahela Connecting	7	67,476	.....	75,547	11,276	8,118	322	30,724	3,244	53,684	21,864	.....	995	20,868	22,384
New York, Chicago & St. Louis	556	574,394	138,827	741,348	72,687	94,029	50,433	208,211	22,062	537,422	203,926	2,081*	14,902	186,943	63,769
New York, Ontario & Western	546	559,701	131,119	719,329	91,293	92,253	9,081	239,652	15,467	447,746	271,583	1,354	22,743	250,194	‡20,974
Ohio & Little Kanawha	74	10,952	6,660	18,949	7,967	3,889	842	8,813	762	22,273	3,324*	.....	1,389	4,713†	‡8,856
Pontiac, Oxford & Northern	100	7,339	7,062	16,068	4,733	803	332	5,735	1,155	12,758	3,310	.....	861	2,449	‡478
St. Louis & Hannibal	103	12,042	5,477	21,711	7,103	1,157	173	5,429	685	14,547	7,164	.....	653	6,511	6,201
Somerset	94	16,996	9,424	27,716	7,024	7,808	127	9,631	558	25,148	2,568	.....	85	2,483	4,279
Southern Indiana	236	84,002	12,967	98,887	14,550	11,624	1,997	25,738	4,849	58,758	40,129	.....	6,928	33,201	34,009
Stephenville, Northern & Southern Tex	43	2,348	1,778	4,481	583	625	221	2,035	503	3,967	514	.....	92	422	.....
Union R.R. of Pennsylvania	31	.....	.....	388,827	37,593	46,556	100	98,420	2,963	185,632	203,195	2,156	2,500	202,851	146,502
Valley R. R. of Virginia	62	8,429	7,506	17,538	3,123	.....	506	6,859	388	10,876	6,662	.....	1,008	5,654	2,069
Washington County	139	22,136	14,841	40,378	7,233	4,409	368	12,102	3,856	27,968	12,410	.....	257	12,153	15,585
Yosemite Valley	79	7,491	20,765	29,520	2,817	1,881	845	4,429	453	10,425	19,095	.....	750	18,345	‡1,443

FISCAL YEAR ENDED JUNE 30, 1909.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Arizona & New Mexico	108	$864,592	$81,705	$977,638	$99,348	$44,636	$932	$148,720	$18,480	$312,116	$665,522	.....	$10,011	$655,511	‡$28,785
Baltimore & Ohio	3,992	53,872,416	12,970,112	71,043,519	9,017,396	10,985,730	1,608,452	24,453,790	1,486,608	47,551,976	23,491,543	$539,249*	2,062,190	20,890,104	3,699,405
Bessemer & Lake Erie	201	5,698,051	296,483	6,060,454	597,648	1,146,634	79,807	1,617,233	99,636	3,540,958	2,519,496	.....	91,000	2,428,496	420,972
Carolina, Clinchfield & Ohio	211	200,988	72,417	289,037	43,600	59,293	14,819	80,985	62,730	261,427	27,610	.....	14,400	13,210	.....
Chicago & Northwestern	7,635	43,619,091	16,875,668	65,978,471	8,422,265	7,845,969	1,127,864	24,666,862	1,128,279	43,191,239	22,787,232	15,907*	2,714,632	20,056,693	1,089,205
Chicago, Cincinnati & Louisville	284	1,007,268	285,685	1,359,104	313,301	293,286	98,613	606,357	70,552	1,382,109	23,005*	.....	40,855	63,860†	71,938
Chicago, St. Paul, Minn. & Omaha	1,739	8,627,853	3,990,944	13,524,650	1,643,784	1,577,831	266,402	5,000,766	342,446	8,831,229	4,693,421	1,712*	641,167	4,050,542	320,438
Cleveland, Lorain & Wheeling	195	3,374,023	221,221	3,796,182	405,339	675,503	73,864	1,237,203	72,973	2,464,882	1,331,300	.....	115,148	1,216,152	‡43,650
Cleveland Terminal & Valley	93	822,072	166,405	1,056,487	154,856	105,407	17,478	440,267	18,644	736,652	319,835	.....	39,400	280,435	48,402
Coal & Coke	191	489,746	124,248	635,174	107,437	161,480	9,896	175,938	25,341	480,092	155,082	67,432	42,000	180,514	105,310
Colorado & Southern	1,250	6,548,466	1,465,986	8,464,716	1,115,603	1,567,997	169,481	2,632,153	296,211	5,781,445	2,683,271	4,500*	251,260	2,427,511	‡24,872
Cumberland Valley	162	1,791,442	557,511	2,470,069	268,157	231,012	45,490	767,880	67,071	1,379,610	1,090,459	5,206	49,004	1,046,662	21,357
Detroit & Mackinac	348	799,097	283,946	1,148,974	183,863	185,230	22,320	371,944	32,688	796,045	352,929	8,538*	85,345	259,046	‡39,396
El Paso & Southwestern Co.	867	5,963,357	986,027	7,274,014	894,771	940,895	114,404	1,975,725	291,925	4,217,720	3,056,294	16,458*	194,907	2,844,929	583,730
Florida East Coast	584	1,708,730	1,141,520	3,373,554	424,402	455,407	63,789	1,112,192	107,426	2,163,216	1,210,338	.....	138,533	1,071,805	570,596
Fort Worth & Denver City	454	3,059,924	1,669,369	4,954,966	761,134	734,436	86,545	1,589,114	173,999	3,345,227	1,609,739	3,293*	108,087	1,498,359	61,704
Kansas City Southern	827	6,638,419	1,306,078	8,771,965	960,600	1,006,698	271,594	2,779,583	331,581	5,350,056	3,421,909	.....	322,279	3,099,630	385,109
Lackawanna & Wyoming Valley	23	52,163	490,410	555,402	34,766	74,375	7,834	190,010	17,941	324,926	230,476	1,924*	6,802	221,750	19,342
Maine Central	931	5,005,111	2,774,480	8,337,723	1,231,551	1,180,584	90,696	3,005,267	271,180	5,779,278	2,558,445	26,068	376,995	2,207,518	‡6,233
Maryland & Pennsylvania	80	197,410	123,802	378,022	49,640	44,597	5,841	137,148	19,099	256,325	121,697	1,475	11,589	111,583	‡11,145
Mississippi River & Bonne Terre	53	538,790	81,784	686,545	80,426	115,002	9,053	240,018	47,211	491,710	194,835	.....	10,949	183,886	‡114,541
Missouri & North Arkansas	346	291,898	157,670	486,371	164,252	83,819	14,658	184,673	23,195	470,597	15,774	.....	19,274	3,500†	3,990
Monongahela	61	888,965	26,451	930,906	113,394	51,788	3,235	213,887	20,841	403,145	527,761	.....	14,400	513,361	122,730
Monongahela Connecting	7	571,007	.....	633,152	71,339	103,580	3,622	282,611	33,568	494,720	138,432	.....	11,654	126,778	121,672
New York, Chicago & St. Louis	556	7,627,924	1,442,034	9,383,911	940,182	1,057,088	533,164	3,793,453	165,838	6,489,725	2,894,186	16,191*	330,412	2,547,583	‡181,982
New York, Ontario & Western	546	6,465,999	1,506,585	8,290,170	920,196	1,380,387	114,263	3,053,847	174,408	5,643,101	2,647,069	36,321*	189,160	2,421,588	‡74,163
Ohio & Little Kanawha	74	152,762	96,228	264,093	61,497	36,177	9,291	102,654	8,716	218,335	45,758	.....	11,007	34,751	46,124
Pontiac, Oxford & Northern	100	127,370	81,960	226,931	50,493	14,005	2,878	65,005	22,518	154,899	72,032	.....	13,066	58,966	14,891
St. Louis & Hannibal	103	143,552	58,335	220,105	70,857	29,000	2,299	71,239	9,291	182,686	37,419	.....	7,840	29,579	8,909
Somerset	94	161,496	94,662	270,944	74,039	52,690	1,601	102,060	7,535	237,926	33,018	.....	1,258	31,760	21,028
Southern Indiana	236	1,002,592	159,814	1,189,455	157,692	181,659	20,507	334,855	73,305	768,018	421,437	.....	83,142	338,295	‡106,760
Stephenville, Northern & Southern Tex	43	80,464	18,253	102,859	8,109	11,079	2,280	29,085	6,963	57,516	45,343	.....	1,292	44,051	.....
Union R.R. of Pennsylvania	31	.....	.....	2,882,325	365,340	515,398	1,210	1,043,872	37,750	1,963,570	918,755	17,697	27,650	908,802	386,756
Valley R. R. of Virginia	62	107,266	73,355	197,383	34,950	121	5,502	90,573	4,997	136,143	61,240	.....	9,263	51,977	‡1,454
Washington County	139	281,401	162,254	483,733	123,912	58,655	3,902	167,625	12,491	366,585	117,148	.....	2,735	114,413	‡2,723
Yosemite Valley	79	46,908	111,384	168,114	30,983	19,861	12,124	37,169	5,681	105,818	62,296	.....	10,193	52,103	23,330

*Deficit. †Loss. ‡Decrease.

Improved Service on the B., R. & P.

The New York Public Service Commission, Second district, has ordered the Buffalo, Rochester & Pittsburgh to improve its service between Silver Lake Junction and East Salamanca by providing an additional train each way daily. The service to be provided is temporary and will be tried for six months, during which time the company is required to furnish the commission with a statement showing the passenger receipts and number of passengers carried on the trains required by the order of the commission. The commission holds that a railway is bound to supply adequate and reasonable passenger service, and in a case where access to a county seat from a considerable part of the county is concerned additional service sufficient to meet the reasonable requirements of the part of the county affected and beyond what would otherwise be reasonable may properly be required, and that the commission may order temporary changes or additions in service for the purpose of making a test as to whether such proposed change or addition is or is not reasonable or necessary. The order was made upon the complaint of Dwight S. Merville and other residents along the line affected. It was shown that a number of residents of Wyoming county are called to Warsaw, the county seat, on legal business, and the trip from several of the stations required nearly a day of 18 hours.

COURT NEWS.

Judge Burdett, in the circuit court at Charleston, W. Va., on July 24 granted an injunction restraining the attorney-general and county prosecutors from enforcing against the Virginian Railway the two-cent passenger rate law passed by the West Virginia legislature in 1907.

The circuit court of Franklin county, Ohio, after a rehearing, has unanimously affirmed the decision handed down April 24, which held illegal the control by the Hocking Valley of the Kanawha & Michigan, the Toledo & Ohio Central, and the Zanesville & Western railway and the allied coal properties. It is expected that an appeal will be taken.

Sanford B. Ladd, representing the state of Missouri, filed at Kansas City on July 28 an appeal to the United States Supreme Court from the decision of the United States district court holding that the Missouri freight and passenger rate laws are confiscatory and unconstitutional. The case selected for appeal is that of the Chicago, Burlington & Quincy, which has a large mileage of both trunk and local lines in the state.

Judge McSurely, of Chicago, rendered a decision on July 29 holding that the Illinois statute prohibiting ticket brokerage is unconstitutional, and quashed indictments against Harry Schwartz, who was arrested charged with scalping. Judge McSurely held that a railway ticket which a man has bought is his personal property and that he has a right to sell it to whom he pleases. Counsel for the state contended that the state supreme court had held the law constitutional, and quoted a decision to this effect.

George J. Kindel, of Denver, has filed suits in the federal court at Denver to restrain the Colorado & Southern, the Atchison, Topeka & Santa Fe, the Denver & Rio Grande and the Chicago, Rock Island & Pacific from advancing freight rates between Galveston and Denver. Mr. Kindel alleges that the rates in force between Galveston and other cities in the middle west, notably St. Louis, Kansas City, Omaha and St. Joseph, are not to be raised, and that, therefore, the advances to Denver are an unjust discrimination against the business men of that city. The following is a table of the present and proposed rates, as set forth in Mr. Kindel's petition and regarding which he complains:

	Rate	
	Present.	Proposed.
First-class	$1.80	$2.05
Class A	.81	.92
Canned goods, green coffee, paints, soda bicarbonate, sugar	.065	.07
Drugs and medicine	1.00	2.05
Leather, harness	.65	1.07
Oilcloths, linoleums	.84	1.10
Wrapping, paper bags	.58	.73
Building, roofing	.51	.62
Soap	.40	.67

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Carl Remington has been elected assistant secretary and assistant treasurer of the Chesapeake & Ohio.

C. J. Wade has been appointed an auditor of the New Orleans Great Northern, succeeding C. K. Mullins, transferred.

The office of the vice-president and general manager of the Grand Trunk Pacific has been permanently located at Winnipeg, Man.

W. J. C. Kenyon, vice-president and general manager of the Illinois Tunnel Company, with office at Chicago, has resigned. See item under Operating Officers.

W. E. Hemingway has been appointed general agent, Executive Department of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with office at Little Rock, Ark.

E. E. Russell, general northern sales agent of the Delaware, Lackawanna & Western Coal Department, has been elected vice-president and general sales agent of the Delaware, Lackawanna & Western Coal Co., which is to buy the coal of the Delaware, Lackawanna & Western at its mines.

B. S. Cable having resigned as general attorney of the Chicago, Rock Island & Pacific at Chicago, M. L. Bell, local attorney at Chicago, and T. R. Beman, assistant attorney of the Oklahoma district, have been each appointed an assistant general attorney, with office at Chicago. Reports heretofore made to Mr. Cable will be handled by E. C. Lindley, general attorney, with office at Chicago.

Operating Officers.

J. N. Haines has been appointed a trainmaster of the Lehigh Valley, with office at Auburn, N. Y., succeeding W. D. Vincent, resigned.

J. F. Caskey has been appointed the superintendent of telegraph of the Lehigh Valley, with office at South Bethlehem, Pa., succeeding F. L. Blendinger.

W. B. Harrison has been appointed a trainmaster of the Wisconsin, Minnesota & Pacific division, Chicago Great Western, with office at Red Wing, Minn.

Otto Holstein, chief train despatcher of the Cerro de Pasco Railway of Peru, has been appointed a chief train despatcher of the Central Railway of Peru, with office at Lima.

James W. Callahan, general superintendent of the Illinois Tunnel Company, has been appointed the general manager, with office at Chicago, succeeding W. J. C. Kenyon, resigned.

E. G. Connette, general manager of the Worcester (Mass.) Consolidated Street Railway, has been appointed transportation engineer of the New York Public Service Commission, First district, with office at New York.

O. H. Wilson, trainmaster of the Eastern division of the Louisiana Railway & Navigation Co., has been transferred as trainmaster to the Western division, with office at Shreveport, La., succeeding W. A. McCloud, resigned. R. B. Foss succeeds Mr. Wilson, with office at Baton Rouge, La.

The Hine system of organization having been adopted on the Houston & Texas Central, the following officers will have the title of assistant superintendent: J. S. Sugrue, assistant superintendent; W. T. Hall, trainmaster; E. M. Moursund, resident engineer, and James Doyle, traveling engineer.

T. M. Barret has been appointed assistant general manager and general superintendent of the Asherton & Gulf, and Mrs. Asher Richardson has been appointed assistant to the general superintendent. The general offices of the company are temporarily at Asher Junction and later will be at Asher, Tex. See item in General News Section.

C. G. Fluhr has been appointed the trainmaster of the First district, Arizona division, of the Atchison, Topeka & Santa Fe, with office at Needles, Ariz. W. Matthie, chief

despatcher at Needles, has been appointed the trainmaster of the Second district, Arizona division, and of the Barnwell district, including Barstow terminal, succeeding A. G. Wild, transferred. F. H. Vandercock succeeds Mr. Matthie.

W. R. Armstrong, assistant superintendent of the Oregon Short Line at Nampa, Idaho, has been appointed the acting superintendent of the Montana division, with office at Pocatello, Idaho, succeeding G. H. Olmstead, granted leave of absence, and the office of assistant superintendent at Nampa is abolished. J. P. Folger, trainmaster at Kemmerer, Wyo., has been transferred to Nampa, and J. W. Husted succeeds Mr. Folger.

Traffic Officers.

Charles J. Hawley has been appointed a contracting freight agent of the Illinois Central, with office at Chicago.

R. J. Smith, agent of the Great Northern at Brandon, Man., has been appointed a general agent, with office at Cincinnati, Ohio.

J. D. Shepherd has been appointed a traveling freight and passenger agent of the El Paso & Southwestern, with office at Chicago.

A. G. Ray has been appointed a chief special agent of the Great Northern, with office at St. Paul, Minn., succeeding D. Allman, resigned.

B. K. Quick has been appointed a traveling passenger agent of the Missouri Pacific, with office at Chattanooga, Ten., succeeding Paul Escott, transferred.

W. E. Hunt, contracting freight agent of the Great Northern at St. Louis, Mo., has been appointed a traveling freight agent, with office at St. Louis. J. M. Sanford succeeds Mr. Hunt.

J. J. McTague, contracting agent of the Chicago, Milwaukee & St. Paul, has been appointed a traveling freight agent, with office at Buffalo, N. Y. T. P. Casey succeeds Mr. McTague.

F. H. Worsley, assistant claim agent of the Denver & Rio Grande, has been appointed the general freight and passenger agent of the Salt Lake & Ogden, with office at Salt Lake City, Utah.

Charles M. Jacobs, chief engineer of the North river division of the Pennsylvania Tunnel & Terminal Railroad, has resigned. The work on the North river tunnels is nearly finished.

John S. Hickey has been appointed a soliciting freight agent of the Atlanta, Birmingham & Atlantic, with office at Chicago. He will report to Charles B. Armstrong, commercial agent.

A. V. B. Gilbert, soliciting freight agent of the Mobile & Ohio at Mobile, Ala., has been appointed the general freight agent of the Tombigbee Valley and the Alabama, Tennessee & Northern.

Emerson Lucas has been appointed a traveling freight agent of the Southern Railway, with office at Nashville, Tenn. Robert D. Tate has been appointed a traveling freight agent, with office at New Orleans, La.

W. H. Tayloe, general passenger agent of the Southern Railway, has been appointed a general agent, passenger and freight traffic departments, with office at Denver, Colo. H. F. Cary succeeds Mr. Tayloe, with office at Washington, D. C.

I. G. Thompson, traveling freight agent of the Chicago, Rock Island & Gulf at Ft. Worth, Tex., has been appointed a traveling freight agent of the Chicago, Burlington & Quincy, with office at Dallas, Tex., succeeding H. O. Byrd, resigned to engage in other business.

C. A. Doherty, division passenger agent, Northwest division of the Chicago Great Western, has been appointed also the division freight and passenger agent of the Wisconsin, Minnesota & Pacific division, with office at St. Paul, Minn., succeeding E. R. Beem, promoted.

L. H. Mussman, chief clerk to the assistant general freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, at St. Louis, has been appointed a commercial agent, with office at Cairo, Ill., succeeding H. H. Roseman, resigned. E. J. Zschirpe, contracting agent at St. Louis, succeeds Mr. Mussman, and L. M. Coffey succeeds Mr. Zschirpe.

F. M. Snavely, city passenger agent of the Chicago & North Western at Milwaukee, Wis., has retired under the pension system of that road. Mr. Snavely has been an active employee of the North Western for 26 years, having been city passenger agent at Milwaukee for 13 years.

J. W. Koester has been appointed an agent of the Traders Despatch, with office at Seattle, Wash., succeeding A. J. Mengel, assigned to other duties. The territory of the Seattle agency has been extended and now includes the state of Washington, except points immediate on north bank of the Columbia river, the northern part of Idaho and the state of Montana.

R. F. Weeks has been appointed a division freight and passenger agent of the Chicago, Milwaukee & Puget Sound, with office at Seattle, Wash. He will have supervision of traffic from Maple Valley, Wash., to, but not including, St. Regis, Mont. The following have been appointed commercial agents: R. L. Ford, with office at Spokane, Wash.; R. M. Boyd, with office at Seattle, Wash., and H. J. Manney, with office at Tacoma, Wash.

The following changes have been made in the traffic department of the Southern Pacific lines in Mexico, Texas and Louisiana: J. M. Farris, traveling freight agent of the Houston & Texas Central at Dallas, Tex., has been appointed a commercial agent, with office at Corsicana, Tex.; W. Y. Morris, tariff inspector of the Galveston, Harrisburg & San Antonio, succeeds Mr. Farris; O. H. Reed, commercial agent of the Houston & East & West Texas and the Houston & Shreveport at Shreveport, La., succeeds Mr. Morris; A. W. Cheesman, general agent of the Galveston, Harrisburg & San Antonio at El Paso, Tex., succeeds Mr. Reed; W. C. McCormick, general agent of the Galveston, Harrisburg & San Antonio and the Houston & Texas Central at Mexico City, Mex., has been appointed a division freight and passenger agent of the Galveston, Harrisburg & San Antonio, with office at El Paso, Tex., where he will assume the duties heretofore performed by Mr. Cheesman; W. E. Barnes, traveling freight and passenger agent of the Galveston, Harrisburg & San Antonio, succeeds Mr. McCormick; Wade Cunningham, soliciting freight agent of the Houston & Texas Central at Dallas, succeeds Mr. Barnes, and T. C. Wagner succeeds Mr. Cunningham.

Engineering and Rolling Stock Officers.

Frank Lane has been appointed the electrical engineer of the Wabash, succeeding W. A. Hopkins, resigned.

D. J. Redding, master mechanic of the Pittsburgh & Lake Erie, has been appointed the assistant superintendent of motive power and his former office has been abolished.

G. S. Turner, general equipment inspector of the Southern Railway, has resigned to become the southern representative for the American Locomotive Sander Co., Philadelphia, Pa.

J. J. Daily has been appointed the roadmaster of the Louisiana division, Choctaw district, of the Chicago, Rock Island & Pacific, with jurisdiction from Alexandria, La., to Eunice, and with office at Le Compte, La.

W. F. Sparks, assistant roadmaster of the St. Louis Southwestern of Texas at Commerce, Tex., has been appointed the roadmaster of the Second district, of the St. Louis, Brownsville & Mexico, with office at Kingsville, Tex., succeeding W. J. Carnohan, resigned.

J. G. Neuffer having resigned as superintendent of machinery of the Illinois Central, the Yazoo & Mississippi Valley and the Indianapolis Southern, J. B. Buker has been appointed the superintendent of the car department and R. W. Bell has been appointed superintendent of machinery in charge of the locomotive department, both with office at Chicago.

Charles W. Van Buren, who was recently appointed Master Car Builder of the eastern lines of the Canadian Pacific, with office at Montreal, Can., was born in 1867 in Rensselaer county, N. Y. He went to common school until he was 16 years old, and for a year attended night school in New York City. His first railway work was in 1889 on the New York Central & Hudson River. He was a carpenter at the West Albany shops

until 1891, when he was made assistant foreman. Two years later he was put in charge of car department work on the Adirondack division at Herkimer, N. Y. In 1896 he was transferred to Utica in charge of car department work on the Adirondack and the Mohawk divisions of the New York Central & Hudson River and the West Shore. In 1905 he went to the Canadian Pacific as general car inspector for the lines east of Port Arthur. He was made division car foreman of the Eastern division in 1906, where he remained until he was promoted to his present position on July 1, 1909.

Special Officers.

The office of G. U. Ryley, land commissioner of the Grand Trunk Pacific, has been moved from Montreal to Winnipeg, Man.

Purchasing Officers.

I. J. Custer, formerly storekeeper of the Atchison, Topeka & Santa Fe Coast at San Bernardino, Cal., has been appointed the storekeeper of the Southern Pacific Lines in Mexico, with office at Empalme, Mex.

T. J. Frier, general storekeeper of the Chicago, Burlington & Quincy, with office at Chicago, has been appointed the purchasing and supply agent of the Wabash, with office at St. Louis, Mo., succeeding C. A. How, resigned.

OBITUARY.

Henry F. Baldwin, chief engineer of the Oregon & Washington, died suddenly of apoplexy at Seattle, Wash., June 17. He was born in 1862 at Waterbury, Md. He graduated from the Massachusetts Institute of Technology with the class of 1884, having taken the course in mechanical engineering. He began railway work in 1884 as rodman on the Louisville & Nashville and later was for several years roadmaster. In August, 1889, he was appointed roadmaster on the New York, Lake Erie & Western, now part of the Erie. In March, 1890, he was made chief engineer of the Chicago & Eastern Illinois, serving also as engineer of maintenance of way. In 1893 he was appointed chief engineer of the Chicago, Peoria & St. Louis, and a year later went to the Erie as engineer of maintenance of way, holding this position for two years. In 1897 he was appointed chief engineer of the Chicago & Alton and in 1904 left railway work to become vice-president of the I. E. Du Pont Powder Co. On July 1, 1907, he was appointed chief engineer of the Oregon & Washington. This road is being built by the Oregon Railroad & Navigation Co. from Portland, Ore., to Seattle, about 230 miles. Mr. Baldwin was chief engineer at the time of his death.

H. F. Baldwin.

Henry M. Putney, chairman of the New Hampshire Railroad Commission, died at Manchester, N. H., on August 1. Before being appointed a member of the railway commission Mr. Putney was a lawyer and a politician prominent in the Republican party in New Hampshire.

William Harrison Stewart, at one time freight traffic manager of the Pennsylvania Lines West, died at his home in Cleveland, Ohio, July 26, after an illness of several months. He was born in 1833 in Ireland and began railway work in 1852. By 1871 he had become general freight agent of the Pennsylvania Company and in 1892 was made freight traffic manager of the Pennsylvania Lines West and shortly after retired from the railway business.

Railroad Construction.

New Incorporations, Surveys, Etc.

Ann Arbor.—See New Haven Coal Mining Co.

Arizona & Colorado.—According to press despatches, final surveys are under way between Gallup, N. Mex., and Durango. The line is projected from Gallup to Durango, with a branch from Gallup to Lordsburg connecting with the Southern Pacific.

Atchison, Topeka & Santa Fe.—An officer writes that the company is building two concrete culverts over Shook's Run, Colorado Springs, under El Paso street, this being part of the work required in connection with a subway crossing Pikes Peak avenue.

Chicago & North Western.—It is said that work will be begun in August on a line to run from Milwaukee, Wis., to La Crosse, passing through Allis and Wauwatosa, about 190 miles. This will give the Chicago & North Western a shorter route than it now has between Milwaukee and La Crosse.

Chicago, Milwaukee & St. Paul.—See Minneapolis, Minn., under Railroad Structures.

Clinton & Oklahoma Western.—Work is under way and a large part of the roadbed completed between Clinton, Okla., and Butler. It is projected to Cheyenne and thence to Texas. It is expected that train service from Clinton to Butler will begin by September 1.

Delaware & Eastern.—The proceeds of the capital stock and bonds which this company recently got permission to issue are to be used for construction work. See Railroad Financial News, July 30, page 216.

Denver, Northwestern & Pacific.—Arrangements are being made to begin work this fall, or perhaps not until next spring, on the extension from Steamboat Springs, Colo., northeast to Hayden, 20 miles.

Detroit, Lansing & Grand Rapids (Electric).—An officer writes that the prospects of building this road from Grand Rapids, Mich., via Lansing to Detroit are good, and it is expected that contracts for grading, track laying, bridges, etc., will be let in March, 1910. Oliver H. Lau is president; Henry M. Wallace, vice-president, and F. A. Bean, chief engineer, Detroit, Mich. (July 23, p. 168.)

Lake Erie & Eastern.—A franchise for a right-of-way through Youngstown, Ohio, has been granted.

Long Island.—The company has just resumed work—suspended some time ago—on the improvements on its line between Fiske Terrace and Manhattan Beach, whereby 14 grade crossings will be eliminated. The Long Island tracks will be carried for 3.3 miles on an embankment alongside the tracks of the Brighton Beach road to Sheepshead Bay, thence by an independent embankment to a new station to be built at Manhattan Beach. Work is also being pushed on the Bay Ridge improvement, a large concrete viaduct having just been completed over First avenue, Bay Ridge. This improvement altogether will have removed 45 grade crossings between Bay Ridge and Fresh Pond road, involving the expenditure of about $6,500,000 by the railway company and $2,500,000 by the city. Queens borough still has over 200 grade crossings. The road is prepared to spend $6,000,000 more toward getting rid of these provided the city will continue its former policy of contributing one-half the expense. The company would, in addition, make various improvements which would benefit the public and greatly augment the taxable value of the neighboring property. During the last session of the legislature a bill authorizing the city to share in the expense of removing these crossings in Queens borough failed of passage. In fact, for the first time in many years the last legislature failed to make any appropriation for continuing the work of grade crossing removal in New York State.

Louisville & Eastern (Electric).—A contract has been let to Charles L. Christopher, superintendent of construction of the Louisville Street Railways, to build an extension on the Louisville & Eastern from Shelbyville, Ky., to Frankfort.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—An officer writes that work will be begun at once on shortening the line in Minneapolis, and that the company expects to spend $500,000 this year and an additional $500,000 later.

MISSOURI, KANSAS & TEXAS.—An officer writes that this company is making a revision of three miles at the station at Witcher, Okla., and a revision of 10 miles between Fallis, Okla., and Luther. The Walsh Construction Co. of Davenport, Iowa, are the contractors, but the railway company is doing the bridging, which consists of building several pile bridges and a considerable number of concrete culverts. Work has been under way for the past three months and it is expected that it will be finished shortly. The earthwork amounts to about 600,000 cubic yards. (July 30, p. 215.)

MONTANA, WYOMING & SOUTHERN.—Incorporated with $5,500,000 capital in New Jersey to build from Bridger, Mont., and Belfry to Bear Creek, 33 miles. Incorporators are Frank S. Gannon, William C. Langley, William H. Seibert, James J. Molley and Charles W. Fernald, all of New York.

MOUNTAIN VALLEY & PLAINS.—Surveys have been completed from Cimmarron, N. Mex., east to Taloga, Okla.

NEW HAVEN COAL MINING CO.—An officer writes that work is now under way on a six-mile spur track in Michigan connecting the company's mine with the Ann Arbor Railroad. The work includes a steel bridge over the Shawnee river; grading finished and a half mile of track laid to the river. A. M. McKenzie, secretary, Toledo, Ohio.

NORTH & SOUTH RAILWAY.—An officer writes that the right-of-way for this proposed road from Smithville, Tex., via Gonzales, Cuero, Goliad, Refugio to Aransas Pass, has been partly procured, and all that is now needed is right-of-way for depot grounds and terminals. Building is to be started immediately after surveys are made.

OKLAHOMA & CHEROKEE CENTRAL.—The property of this company, organized in 1904, has been sold and a new organization has been formed to immediately build the line. The road is graded from Chelsea, Okla., to the Verdigris river. The line is to run from Adair, on the Missouri, Kansas & Texas, west to Blackwell, 100 miles.

SANOODY VALLEY RAILWAY.—A member of a banking firm formerly interested in this company writes that the road, which runs from De Kalb, Miss., to a connection with the Mobile & Ohio at Sucarnochee, Miss., is nearing completion and trains will be run in a short time. Building materials have already been bought. It is thought unlikely that an extension to a connection with the Mobile, Jackson & Kansas City will be built by the Sanoody Valley Railway in the near future. S. O. Bell, of De Kalb, Miss., is president. (July 23, p. 169.)

TUCUMCARI, TEXICO & SOUTHEASTERN.—An officer writes that the following is substantially correct: A road is to be built within the next two years from Texico, N. Mex., northwest about 81 miles to a connection with the Chicago, Rock Island & El Paso at Tucumcari or some other point within 30 miles of there.

VIRGINIAN RAILWAY.—Maps have been filed with the clerk of court of Rawley county, W. Va., showing proposed branch lines. These roads, with their approximate lengths, are as follows: Stone Coal branch, four miles; Devil's Fork branch, six miles; Upper Stone Coal branch, two miles; East Fork extension of the Upper Winding Gulf branch, one mile; Tommy Creek branch, 4½ miles; Piney Creek extension of the Winding Gulf branch, 8 miles.

WINSTON-SALEM SOUTHBOUND.—This company, which is building a line from Winston-Salem, N. C., south to Wadesboro, and is being financed jointly by the Norfolk & Western and the Atlantic Coast Line, has elected the following officers: H. E. Fries, president, Winston-Salem, N. C.; T. M. Emerson, vice-president, Wilmington, N. C.; H. F. Wilkinson, secretary, Roanoke, Va.; W. F. Shaffner, treasurer, Winston-Salem, N. C., and M. H. Willis, auditor, Winston-Salem, N. C. E. T. Burnett has been appointed purchasing agent, with office at Roanoke, Va., and O. H. P. Cornell, chief engineer, with office at Winston-Salem, N. C.

Railroad Financial News.

ATLANTA, BIRMINGHAM & ATLANTIC.—Clark, Dodge & Co. and Moffat & White, both of New York, are offering the new issue of $3,250,000 two-year 5 per cent. receivers' certificates at 99½ to yield 5¼.

CANADIAN NORTHERN.—A press despatch says that this company has been granted trackage rights over the Canadian Pacific's line from Sudbury, Ont., to Port Arthur. This gives the Canadian Northern a through line from Toronto, Ont., to Winnipeg, Man., Edmonton and other western points.

CANADIAN PACIFIC.—It is said that the company has sold in England $5,000,000 4 per cent. preferred stock at 102. On June 30, 1908, there was outstanding $48,803,332 preferred stock.

CAROLINA, CLINCHFIELD & OHIO.—Arrangements have been made for the sale of $5,000,000 10-year 5 per cent. mortgage notes of July, 1909-1919. The notes are junior to the $10,000,000 5 per cent. first mortgage bonds of 1908.

CHICAGO, CINCINNATI & LOUISVILLE.—On behalf of H. B. Hollins & Co., New York, representing the first mortgage bondholders, the trustee of these bonds has made an application for a second receiver. E. C. Goodrich is now receiver.

CHICAGO, PEORIA & ST. LOUIS.—The security-holders committee, Charles H. Warren, chairman, has given out the plan for reorganization and foreclosure, to which the owners of the outstanding securities have assented. The following is an abstract of the plan:

Capitalization of the Present Company.

$2,000,000 prior lien 4½ per cent. bonds (which remain undisturbed);	$3,750,000 preferred stock; 3,600,000 common stock; 181,000 equip. and car trust notes; 96,750 consol. mort. coupons, overdue.
2,000,000 consol. mort. 5 per cent. bonds;	
2,000,000 income mort. 5 per cent. bonds;	

Payments required from holders of certificates of deposit when deposited under this plan to cover expenses of committees of 1901 and 1904.

Ctfs issued by 1st Nat. Bank, N.Y.City:	July 17, 1901.	Aug. 1, 1904.
For each income bond	$3.40	$5.75
For each share of preferred stock	.15	.24
For each share of common stock	.10	.17

Certificates of deposit issued by the Bankers' Trust Co. for securities deposited under "security-holders committee" circular of June 17, 1909, may be deposited under this plan without expense.

New securities to be issued in exchange for deposited securities on payment of subscriptions specified below.

Security deposited.	Cash payment Reorganization Committee.	New Gen. and Ref. 4½ per ct. bonds.	New stock (Voting Tr. Crtfs.).
$1,000 Consol. mort. bonds	.....	$500.00*	$625.00
100 Do., overdue coupons	.....	50.00*	62.50
1,000 Equip. or car tr. notes	.....	1,000.00	.....
1,000 Income mortgage bonds	$100.00	100.00	400.00
100 Preferred stock	7.00	7.00	24.50
100 Common stock	3.00	3.00	9.00

*Interest on these bonds reduced to 3 per cent for first six years.

Or for security holders who may wish to participate but prefer not to make a cash payment as above provided, the securities named will be received for participation on the following basis:

$1,000 Income mort. bonds.$60 in new stock (voting trust certificates)
100 Preferred stock .... 4 in new stock (voting trust certificates)
100 Common stock ..... 2 in new stock (voting trust certificates)

New Bonds and Stock.

The new company shall assume the obligation of the existing prior lien mortgage of $2,000,000 and in addition shall authorize:

General and refunding mortgage 30-year 4½ per cent. bonds, bearing interest from Dec. 1, 1909. Such of these bonds as are issued in exchange for present consolidated mortgage bonds and unpaid coupons are to be reduced to 3 per cent. for the first six years. For six years the new bonds are to be subject to call at par upon any interest date thereafter at 107½; issue limited to	$15,000,000
Issued for use under this plan	$2,850,000
Reserved to refund prior lien bonds	$2,000,000
Do. for use in retiring prior lien bonds	150,000
Do. for extensions, equipment and improvmts.	10,000,000
Stock, all to be issued for use under this plan	4,000,000

Out of the $2,850,000 "general and refunding" 4½ per

cent. bonds $850,000 will be placed in the treasury of the new company, the past-due coupons and all car and equipment trust notes will be funded, all bills payable will be retired, and it is estimated that after providing for the floating debt the new company will have available as free treasury assets in cash and "general and refunding mortgage" bonds over $1,000,000, which will give the new company funds necessary to make needed improvements.

Under this plan the new company will start with a fixed charge upon securities outstanding in the hands of the public at about $154,000 for the first six years, of which $25,000 would represent the interest on new capital. This amount of fixed charge will be increased about $15,000 after the first six years by the increase in rate from 3 per cent. to 4½ per cent. on the "general and refunding mortgage" bonds issued in exchange for old securities.

CHICAGO GREAT WESTERN.—More than 97 per cent. of the debenture stock and a substantial majority of the other classes of stock have accepted the reorganization plan and the plan has been declared operative.

CUBA EASTERN.—The United States Circuit Court has entered a decree of foreclosure sale under the first and refunding 6 per cent. mortgage of 1907. There are $2,859,000 bonds outstanding, and the March and September, 1908, and March, 1909, coupons have not been paid, making the amount of principal and interest due on the bonds $3,185,878.

DELAWARE, LACKAWANNA & WESTERN.—It is understood that the stockholders have, with a very few exceptions, exercised their right to subscribe for stock of the Delaware, Lackawanna & Western Coal Co. to the extent of 25 per cent. of their holdings of railway stock, and there have been a few transactions recorded of sales on the New York curb of stock of the coal company at prices ranging from $210 to $250. (July 9, p. 80.)

DENVER & RIO GRANDE.—Blair & Co., New York, have sold to the Deutsche Bank of Berlin $5,000,000 Denver & Rio Grande first and refunding 5 per cent. gold bonds of 1908-1955.

FORT DODGE, DES MOINES & SOUTHERN.—The coupons due July 1 on the 5 per cent. first mortgage bonds have not been paid, nor have the coupons due January 1, 1909. There are $2,200,000 first mortgage bonds outstanding.

GRAND TRUNK PACIFIC.—N. M. Rothchild & Sons sold recently in London £2,000,000 ($10,000,000) 3 per cent. first mortgage bonds of 1905-1962, guaranteed principal and interest by the government of the Dominion of Canada. The bonds, which are part of an authorized issue of £14,000,000 ($70,000,000), of which there were previously outstanding £3,200,000 ($16,000,000), were sold at 82½.

HOCKING VALLEY.—See an item in regard to this company under Court News.

INDIANAPOLIS SOUTHERN.—A new mortgage on the road running from Indianapolis to Effingham with the Bloomington branch, 179 miles, has been authorized to secure $10,000,000 bonds. This mortgage is to take the place of one dated 1903, under which $9,950,508 5 per cent. bonds were issued. These bonds were taken and are held by the Illinois Central, which controls the road, but does not operate it.

INTERBOROUGH RAPID TRANSIT.—The $10,000,000 3-year 5 per cent. notes dated March 1, 1907, have been called for payment on September 1 at 101.

METROPOLITAN SECURITIES CO.—See New York City Railway.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Wm. A. Read & Co., New York, have bought $1,000,000 consolidated mortgage 4 per cent. bonds of 1888-1938, and, it is understood, have resold the greater part of these bonds. They are now about $45,891,000 consolidated bonds outstanding.

NEW YORK CITY RAILWAY.—The United States Circuit Court of Appeals has affirmed the judgment for $5,271,582 awarded by a lower court in favor of the New York City Railway. This is the amount claimed to be due by the Metropolitan Securities Co. to the New York City Railway.

ST. LOUIS & SAN FRANCISCO.—La Banque Privee is offering at 92½ $10,000,000 5 per cent. general lien bonds of May 1, 1907, 1922-1927. These bonds, which are part of an authorized issue of $109,850,400, are in denomination of $100, with the fixed rate of exchange of 5 francs 16 centimes to the dollar. See an item under General News.

VIRGINIAN RAILWAY.—See an item in regard to this company under Court News.

WESTERN MARYLAND.—The following is an abstract of the plan of reorganization dated July 26, 1909:

The Present Capitalization and Floating Indebtedness are Substantially as Follows:

I. Bonds and Guaranteed Stock not in default:		
Western Maryland 1st mort. 4 per cent.	$42,518,000	
Divisional bonds	6,200,000	
Leased line bonds	1,659,300	
Leased line guaranteed stock outstanding	574,650	
		$50,951,950
II. Bonds in default:		
Wstn Md. general lien & convertible bonds	$10,000,000	
Amount of coupons thereon in default including coupon maturing Oct. 1, 1909, with interest at 6 per cent. for period of default	836,000	
		10,836,000
III. Receiver's Obligations as of July 1, 1909:		
Equipment certificates	$2,000,000	
Car trust certificates	510,000	
First mortgage interest certificates	350,000	
George's Cr'k and Cumberland certificates	1,250,000	
Uniontown and Wheeling certificates	323,850	
Note for rails	58,996	
	$4,492,846	
IV. Notes, accounts and claims admitted		
Lien notes on Fairmont coal lands with interest to July 1, 1909	$1,854,640	
Other items	414,811	
V. Estimated cash needed:		
For improvements and for current and miscellaneous requirements in reorganization	1,511,863	
Total maturing obligations and cash requirements		8,274,160
VI. Disputed or foreclosable claims		1,714,091
VII. Capital stock (authorized issue $60,000,000)		15,685,400
Total		$87,461,601

A new company will issue in acquisition of the property of the old company $10,000,000 four per cent. non-cumulative preferred stock (par value $100), preferred as to dividends and in liquidation, convertible at the option of the holder into common stock at par and redeemable at the option of the company at par, and $23,959,560 common stock (par value $100) of an authorized issue of $50,000,000.

The holders of certificates of deposit for general lien and convertible 4 per cent. bonds will receive:

(*a*) For principal, 100 per cent., viz., $10,000,000, in new 4 per cent. preferred stock.

(*b*) For unpaid overdue coupons (including the coupon maturing October 1, 1909) with interest thereon 8.36 per cent., viz., $836,000, in new common stock.

The required $8,274,160 cash will be raised by sale of $20,685,400 of common stock to a banker's syndicate under the management of Blair & Co., New York, who will offer the same as follows:

(*a*) To the holders of certificates of deposit for $10,000,000 Western Maryland general lien and convertible bonds 50 per cent. of their holdings, *i. e.*, $5,000,000 new stock, for 40 per cent of its par value, or.	$2,000,000
(*b*) To the holders of $15,685,400 Western Maryland stock, in exchange for their old stock and on payment of 40 per cent of the par value thereof in cash, 100 per cent of their holdings, *i. e.*, $15,685,400 new common stock for	6,274,160
	$8,274,160

The capitalization of the new company will, under this plan, be as follows: First mortgage and underlying bonds outstanding, $50,951,950; non-cumulative 4 per cent. preferred stock outstanding, $10,000,000; common stock outstanding, $23,959,560; total capitalization, $84,911,510. This will call for charges of $2,184,598 per year. The estimated net income for the year ended June 30, 1909, was $2,617,500, from which there will be deducted an arbitrary charge for depreciation of about $151,500. These earnings do not include any income from the Fairmont coal lands, which have never been opened for operation. There are about 25,000 acres of this coal land, costing over $3,200,000, and the plan says that a very moderate initial development and operation of the lands should show at least 5 per cent. on that investment.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Missouri, Oklahoma & Gulf has ordered one locomotive from the Baldwin Locomotive Works.

The Crane Iron Works, Chicago, has ordered one locomotive from the Baldwin Locomotive Works.

The Laurenburg & Southern, Laurenburg, N. C., is said to be in the market for one locomotive. This is not yet confirmed.

The Little River Railroad Co., Townsend, Tenn., has received the compound, Mallet articulated locomotive ordered from the Baldwin Locomotive Works, as reported in the *Railroad Age Gazette* of July 16.

The Houston Belt & Terminal Ry. has ordered three six-wheel switching, oil-burning locomotives from the Baldwin Locomotive Works, as mentioned in the *Railroad Age Gazette* of July 16. The date of delivery is set for August 23.

CAR BUILDING.

The Chicago City Railways are in the market for 50 city cars and two funeral cars.

The St. Louis & San Francisco has ordered six dining cars from the American Car & Foundry Co.

The Jacksonville Electric Co., Jacksonville, Fla., has ordered five pay-as-you-enter cars from the Cincinnati Car Co.

The Chicago, Burlington & Quincy is in the market for 500 flat cars and will be in the market for 500 to 1,000 stock cars.

The Laurenburg & Southern, Laurenburg, N. C., is said to be in the market for one passenger car. This is not confirmed.

The Kansas City Railway & Light Co. is said to be in the market for 25 motor and 10 trail cars. This is not yet confirmed.

The Louisville Railway, Louisville, Ky., has ordered 33 car bodies from the St. Louis Car Co. The trucks have not yet been ordered.

The St. Joseph & Grand Island has ordered three motor cars from the McKeen Motor Car Co. Each will be 70 ft. long and will seat 90 passengers.

The Nashville Interurban Co., Nashville, Tenn., has ordered an electric passenger car and also an express car from the J. G. Brill Co., Philadelphia, Pa.

The Milwaukee Electric Railway & Light Co. has ordered the 100 city cars mentioned in the *Railroad Age Gazette* of July 23 from the St. Louis Car Co.

The Chicago Railways Co. is rebuilding 328 of its old cars into the pay-as-you-enter type and some of the equipment necessary will have to be purchased.

The Chicago & Oak Park Elevated, Chicago, reported in the *Railroad Age Gazette* of July 30 as in the market for 20 cars, has ordered this equipment from the J. G. Brill Car Co.

The Chicago & North Western is said to have ordered the 1,500 steel underframe gondolas mentioned in the *Railroad Age Gazette* of July 23 from the Pullman Company. This report cannot be confirmed.

The Northern Pacific, reported in the *Railroad Age Gazette* of July 16 as having ordered 1,000 forty-ton box cars from the Pullman Co., has increased this order to 1,800. The order for 200 cars from the Seattle Car Co. makes the 2,000 total originally mentioned.

The Pennsylvania has ordered 3,155 freight cars for the Lines West and 4,845 for the Lines East. The orders for the Lines East are as follows: Pressed Steel Car Co., 350 box, 350 hopper, 500 coke; American Car & Foundry Co., 500 box; Standard Steel Car Co., 750 hopper; Cambria Steel Co., 500 coke; company shops at Altoona, 1,895 miscellaneous.

The Chicago, Burlington & Quincy has ordered 500 fifty-ton, all-steel gondola cars from the Pressed Steel Car Co. The order for box cars from the American Car & Foundry Co. was for 3,000, instead of 2,000, as reported last week. The box cars are to be all-wood, 40-tons capacity, and will weigh 35,800 lbs. The over-all measurements are: Length, 43 ft. 4¼ in.; width, 9 ft. 2¾ in.; height, 12 ft. 11$\frac{11}{16}$ in., and the inside measurements are: Length, 40 ft. 5⅝ in.; width, 8 ft. 6⅛ in.; height, 8 ft. The 500 refrigerators ordered from the American Car & Foundry Co., mentioned last week, are to be all-wood, 30 tons capacity, and will weigh 46,000 lbs. The over-all measurements are: Length, 42 ft. 7 in.; width, 9 ft. 5¼ in.; height, 14 ft. 2⅞ in., and inside, length, 39 ft.; width, 8 ft. 3½ in.; height, 7 ft. 5¾ in.

The Puget Sound Electric has ordered, through the Stone & Webster Engineering Corporation, Boston, Mass., the one motor combination baggage and smoking car and the one trailer parlor car mentioned in the *Railroad Age Gazette* of June 11. The combination car will measure 44 ft. 11 in. long and 8 ft. 2¼ in. wide, inside measurements, and 55 ft. 9 in. long and 9 ft. 2 in. wide, over all. The parlor car will measure 50 ft. 4 in. long and 8 ft. 4¾ in. wide, inside measurements, and 58 ft. 3 in. long and 9 ft. 4 in. wide, over all. The motor car will have General Electric 66-four-motor equipment. The special equipment for both cars includes:

Brakes	Westinghouse
Heating system	Consolidated Car Heating Co.
Trucks	Baldwin
Wheels	Standard Steel Works Co.

IRON AND STEEL.

The Pennsylvania has ordered 5,000 tons of rails.

The Wabash has ordered 2,500 tons of rails from the Lackawanna Steel Co.

The Atchison, Topeka & Santa Fe has ordered 7,800 tons of rails from the Illinois Steel Co.

The New York, Westchester & Boston is in the market for 22,000 tons of structural material.

The Lehigh Valley has ordered 2,000 tons of structural steel for a viaduct in Jersey City, N. J.

The United Railways, St. Louis, Mo., have ordered 650 tons of rails from the Illinois Steel Co.

The Denver & Rio Grande is said to have ordered 3,000 tons of rails from the Carnegie Steel Co.

The Illinois Central has ordered 250 tons of structural steel for a 177-ft. bridge span from the American Bridge Co.

The Chilian Government is in the market for 3,000 tons of rails, and as more lines are to be started this year large quantities of steel will be needed later. The Direccion Joneral de Obras Publicas, Santiago, Chile, has this construction in charge.

General Conditions in Steel.—The advance last week of $2 per ton in wire products is this week followed by an advance, by the United States Steel Corporation, of $1 per ton in steel bars, angles, plates and beams, steel bar sales now being on the basis of $1.30 Pittsburgh, the other classes being $1.40 Pittsburgh. These advances are said to result from the increased demand and congestion at the mills. Similar conditions evidently warranted the independent companies some weeks ago making advances in prices similar to the present ones of the corporation. Existing prices are still considerably lower than the quotations prevailing in the early part of the year. Structural steel will have to advance $4 a ton before it gets up to the average of six months ago; steel bars, $2 a ton; tin plate $5 a ton, and sheets, $6 a ton.

RAILROAD STRUCTURES.

Chickasha, Okla.—See Shawnee, Okla.

Colorado Springs, Colo.—See Atchison, Topeka & Santa Fe under Railroad Construction.

Duluth, Minn.—Work, it is said, has been begun by the Northern Pacific on the replacing of the present wooden trestle over Jenswold street with a steel and concrete bridge

Enid, Okla.—See Shawnee, Okla.

Jersey City, N. J.—The Lehigh Valley has ordered structural steel for a viaduct.

Lazare, Tex.—See Quanah, Tex.

Minneapolis, Minn.—An officer of the Chicago, Milwaukee & St. Paul writes that plans are being made for grade separation in Minneapolis, but neither plans nor estimates are completed. It has not been decided whether tracks will be raised or depressed.

Montgomery, Ala.—Fire recently destroyed the Atlantic Coast Line's West End car department, comprising paint, carpenter and repair shops, erecting shed and doctor's office. The loss is estimated at $15,000.

Mt. Sterling, Ky.—The Chesapeake & Ohio has let the contract for the erection of a passenger depot of brick and stone, to cost $18,000.

New London, Conn.—An officer of the New York, New Haven & Hartford writes concerning the newspaper reports to the effect that the company was to build a new bridge over the Thames river that the only basis for such a report is that the company has made application to the War Department for a location.

Paducah, Tex.—See Quanah, Tex.

Provo, Utah.—The citizens voted July 27 for the erection of a union station.

Quanah, Tex.—An officer of the Quanah, Acme & Pacific writes that excavation is now being made for the new passenger depot and general offices mentioned in the *Railroad Age Gazette* of May 7. This building is to be 66 ft. x 100 ft., Mission style, two-story with basement, plastered inside and out, and entirely up-to-date in its furnishings. A five-stall roundhouse is to be built next, and later a coach shed 50 ft. x 150 ft., and a freight depot 30 ft. x 150 ft. All of these buildings are to be of solid concrete construction. Depots are also to be built at Lazare, Swearingen and Paducah. A concrete section house to accommodate 50 men will be built between Quanah and Paducah. The road is now completed for a distance of 24½ miles.

Richmond, Va.—It is said the Chesapeake & Ohio has prepared plans for a brick and concrete freight station and warehouse to cost about $50,000.

The Belle Isle bridge over the James river, on the Southern Railway, was recently burned, with a loss of $50,000.

Shawnee, Okla.—The Chicago, Rock Island & Pacific is making extensive improvements on its lines in Oklahoma. Among other projects recently completed or now under way are the new depot at Shawnee, a power plant and eating house at Chickasha, treating plants at Yukon and Sayre, a steel bridge over Main street in Enid, and considerable ballasting and laying of heavier rails at various points along the line.

Swearingen, Tex.—See Quanah, Tex.

Sayre, Okla.—See Shawnee, Okla.

Wichita Falls, Tex.—An officer of the Wichita Falls & Northwestern writes that the company expects to build a depot, but that no work will be started at present. The state legislature passed an act, effective in August, 1909, empowering the State Railroad Commission to require the construction of union depots, and if the commission takes such action in the case of Wichita Falls the company will co-operate in pushing that plan.

Yukon, Okla.—See Shawnee, Okla.

Supply Trade News.

J. M. Crowe has left the Ritter Folding Door Co., Cincinnati, Ohio, and is now president of the Central Western Supply Co., Cincinnati.

An official of the Railway Steel-Spring Co., New York, is quoted as saying that the company's plants are now operating at from 60 to 75 per cent. of capacity.

The Asbestos Protected Metal Co., Canton, Mass., has just completed plans for an addition to its plant at Canton, and the extension of its head office building.

G. S. Turner, until recently General Equipment Inspector of the Southern Railway, will hereafter represent in the South the American Locomotive Sander Co., Philadelphia, Pa.

Olin, Gibberson & Hilands, New York, have been appointed exclusive agents in New England and the middle states for the sale of iron body gate valves manufactured by the American Valve Co., Coxsackie, N. Y.

Universal window fixtures, made by the Grip Nut Co., Chicago, will be used on 16 chair cars, 25 coaches and 6 all-steel dining cars to be built by the American Car & Foundry Co., New York, for the Rock Island-Frisco lines.

The Case Crane Co., Columbus, Ohio, has received an order from the Hocking Valley for an 85-ft. span electric crane for its shops at Logan, Ohio. The road is having 75 new cars built at this plant, which is being run to full capacity.

The Isthmian Canal Commission asks bids up to August 10 on miscellaneous electrical fixtures, fittings, batteries, cable, insulation, etc. (Circular No. 526.) Bids are asked up to August 18 on two turbine pumps and motors; also, piping, valves, etc. (Circular No. 528A.)

The sole United States agency, which has been held for some years past by Edwin R. Kent & Co., for the sale of the products of Edgar Allen & Co., Ltd., Sheffield, England, terminated on June 30. There will be maintained in Chicago and New York stocks of Allen tool steels and other specialties, and the business in this country will in future be conducted in the name and under the direct and personal management of Edgar Allen & Co., Ltd.

Charles E. Morrill, president of Valentine & Company, varnish and color manufacturers, New York and Chicago, died at his home in Chicago on August 2, after a long illness. He was 77 years old. He was born in East Kingston, N. H., January 11, 1832, and at the age of 16 was apprenticed to a shoemaker. Later he spent a short time in a dry goods and grocery store, and in 1859 entered the employ of Stinson, Valentine & Co., which later became Valentine & Company. He was shipping clerk until 1862, and then traveling salesman for 20 years. He was made Chicago manager in 1882, vice-president in 1899, and a year later became president. Mr. Morrill was a member of the Union League and Washington Park clubs of Chicago. He is survived by a son and two daughters, his wife having died six years ago. Burial was at East Kingston on the 4th inst.

TRADE PUBLICATIONS.

Brushes.—The Wolfe Brush Co., Pittsburgh, Pa., has issued catalogue No. 58. It has 126 pages and illustrates and describes, with prices, a wide variety of brushes.

The Panhandle of Idaho.—This is a book of views published by the Coeur d'Alene Commercial Club, of Coeur d'Alene, Idaho. The scenery of the Panhandle and the important buildings in Coeur d'Alene and nearby towns are displayed to advantage with short descriptive notes on all views.

Articulated Compound Locomotives.—The American Locomotive Co., New York, has published pamphlet No. 10,034, in style uniform with its usual pamphlets, consisting of the paper on Articulated Compound Locomotives read before the American Society of Mechanical Engineers last December by C. J. Mellin. Extracts from the discussion of the paper are included.